THE IRON AGE

New York, October 14, 1920

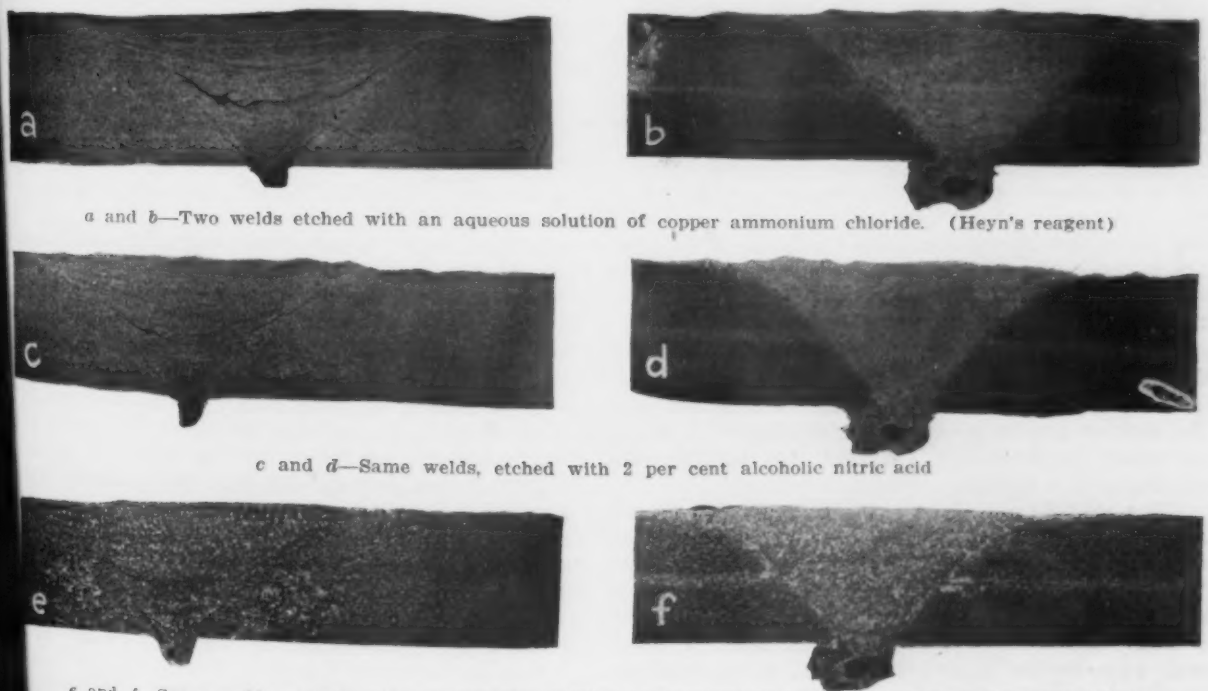
ESTABLISHED 1855 VOL. 106: No. 16

Revealing Macrostructure of Iron and Steel

Hitherto Overlooked Use of Ammonium Persulphate—Particularly Valuable for Indicating Crystalline Condition, and Easy and Cleanly to Apply

BY HENRY S. RAWDON[1]

IN the metallographic examination of any metallic material, a study of the *macro*structure occupies a prominent and important place. It is generally necessary to use special reagents for revealing the different structural features and many such etching solutions have been described and their use is now a routine matter in most metallographic laboratories. One of the most widely used reagents for revealing the macrostructure of copper alloys, particularly the brasses and bronzes, is ammonium persulphate. This has also been suggested as a means for revealing the *micro*structure of iron[2] although not used to any appreciable extent but the advantages of its use as a macroscopic etching medium for iron and steel appears to have been very largely overlooked. In the following discussion the use of ammonium persulphate for this purpose and the structural features which it reveals in a particularly striking manner are pointed out.



a and *b*—Two welds etched with an aqueous solution of copper ammonium chloride. (Heyn's reagent)

c and *d*—Same welds, etched with 2 per cent alcoholic nitric acid

e and *f*—Same welds etched with an aqueous solution (approximately 1 per cent) of ammonium persulphate

Fig. 1—The Macroscopic Structure of Fusion Welds (oxy-acetylene process) as Revealed by Various Etching Reagents. The characteristic crystalline condition is revealed best by the persulphate reagent. Photographs actual size

Method of Etching

1. *Principles underlying the action.*—Ammonium persulphate is a very strong oxidizing agent and decomposes readily when dissolved in water. According to Treadwell[3], the fundamental reaction which occurs when water is added to any persulphate is represented by the following equation:—

(1) $2(NH_4)_2S_2O_8 + 2H_2O = 2(NH_4)_2SO_4 + 2H_2SO_4 + O_2$.

A further reaction occurs with ammonium persulphate by which some of the ammonia is oxidized to the form of nitrate.

(2) $8(NH_4)_2S_2O_8 + 6H_2O = 7(NH_4)_2SO_4 + 9H_2SO_4 + 2HNO_3$.

[1] Physicist, Bureau of Standards, Department of Commerce, Washington. Printed by permission of the director of the bureau.

[2] J. Czochralski: Principles of Etching Phenomena and Metallographic Etching Processes; *Stahl und Eisen:* 35, No. 38, p. 1073, 1915.

[3] Treadwell: Analytical Chemistry, vol. II, p. 595.

The foregoing equations indicate that the general effect of ammonium persulphate as an etching medium is that of a dilute acid, the action of which is intensified by the presence of free oxygen. In a previous article[1] the importance of available oxygen in metallographic etching reagents has been pointed out. It may be easily shown also that aqueous solutions of ammonium sulphate have a considerable etching action upon segregated steels, hence it is very probable that the sulphate which is formed as one of the reaction products aids somewhat in the etching action of the persulphate solution.

2. *Method of Application.* On account of the readiness with which ammonium persulphate crystals decompose when water is added to them, the etching solution must always be freshly prepared just before use. One gram of the salt in 10 cu.cm. of water was found to give excellent results. If desired, the amount of persulphate may be increased considerably, for instance, to 2 g in 10 cm^3 of water. The salt dissolves gradually in the water hence the exact concentration of the etching solution cannot be stated.

The etching is best carried out by means of a cotton swab which has been soaked in the solution. The swab is rubbed over the face of the specimen, considerable pressure being used. A fine polish of the specimen is unnecessary; usually it is sufficient to finish the face on fine emery paper, for instance, 00 French emery paper. The dark oxide film which often forms on the freshly etched face of the specimen if it is allowed to stand in the air without drying for a few minutes can be easily removed by a fresh application of the etching solution on the cotton swab. An etching period of from one to two minutes is usually sufficient.

One of the advantages of the method of etching described is the readiness of control of the process. The surface is constantly under observation and the etching can be stopped at any instant when the structure is distinctly revealed, by holding the specimen in a running stream of water.

The photographing of the etched surface of the specimen is best carried out while the specimen is immersed in water, alcohol, or light oil. In case the specimen is too large for immersion, the surface may be rubbed with oil or glycerine in order to increase the brilliancy of the etch-pattern. In general, this device is helpful in the photographing of all macroscopic specimens, etched by any reagent whatever.

Typical Results

In the following figures a few illustrations, chosen from a considerable number of specimens etched by this method are given to show the results obtained by the use of the reagent. They also illustrate the fact that in some cases, features are revealed by the persulphate, which would be missed entirely if sole dependence were placed upon some other reagent.

1. *Crystalline heterogeneity.* Ammonium persulphate is most admirable for revealing crystalline heterogeneity of any material. This is illustrated by Fig. 1, which shows sections of two fusion welds made by the oxyacetylene process. Etching with an aqueous solution of copper ammonium chloride and with alcoholic nitric acid, both fail to reveal clearly the pronounced grain growth which accompanied the welding process and which influences to a very marked degree the mechanical properties of the weld. This is very clearly revealed by the use of the persulphate. A single type of etching reagent should not be depended upon for completely revealing the macrostructure of any specimen. Each reagent used, as illustrated in Fig. 1, reveals certain characteristic features of the material under observation. It appears, however, that the persulphate solution revealed more features in a single etching than did either of the other two.

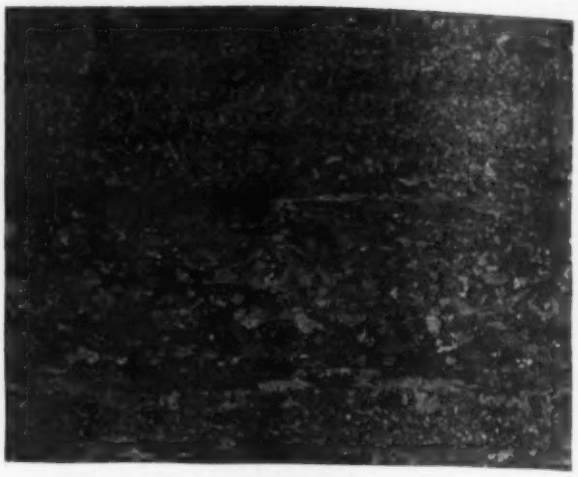
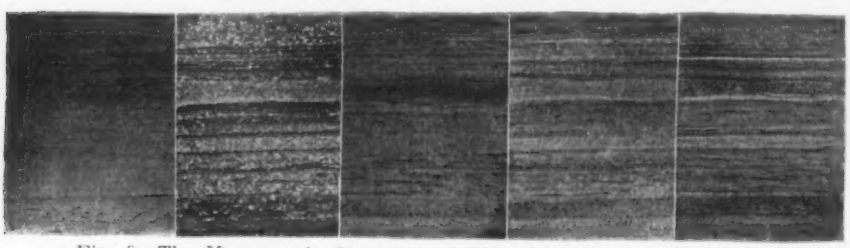


Fig. 3—Macrostructure of Wrought Iron Revealed by Ammonium Persulphate. Same specimen as the second photograph of Fig. 2 at three times magnification to reveal the characteristic crystalline condition

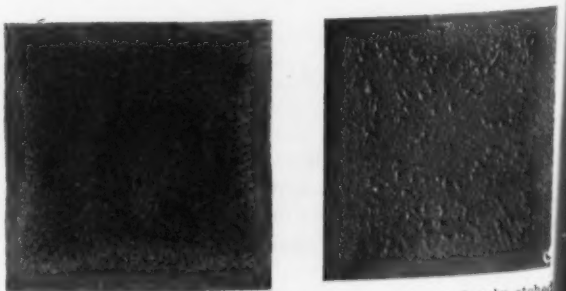


Etching conditions—Left to right, 2 per cent alcoholic nitric acid; aqueous solution (approximately 1 per cent) of ammonium persulphate; aqueous solution of copper ammonium chloride (Heyn's reagent); cupric reagent (Stead's reagent for revealing phosphorus banding); deep etching (2 minutes) in hot concentrated hydrochloric acid

Fig. 2—The Macroscopic Structure of Wrought Iron as Revealed by Various Etching Reagents—Actual Size

In Fig. 2, a specimen of commercial wrought iron is shown and the results obtained by the use of ammonium persulphate may be compared with those of four other reagents in common use. Although the characteristic "streaky" condition is revealed by several, the peculiar variations in the crystalline condition are revealed only by the persulphate.

In Fig. 3, the same specimen is shown at a



Aqueous solution of ammonium persulphate

Same specimen deeply etched with hot concentrated hydrochloric acid

Fig. 4—Macrostructure of Segregated Steel Bar Revealed by Different Etching Methods—Enlarged About Two Times

[1] Henry S. Rawdon and Marjorie G. Lorentz; B. S. Sci. Papers in press.

slightly higher magnification in order to reveal the crystalline pattern more plainly. The material, when treated with the persulphate, has the appearance of being deeply etched. This is not so however, as the etch pattern can be readily removed by rubbing the surface with emery flour.

a—Sulphur print

b—Specimen *a* was deeply etched with hot concentrated hydrochloric acid, surface was then inked with printer's ink and a "print" made

c—Same specimen, re-polished and etched with copper ammonium chloride (Heyn's reagent)

d—Same specimen, re-polished, etched with ammonium persulphate

Fig. 5—Segregation in steel rails revealed by different methods

Fig. 2, represents the order in which the successive etchings of the specimen were carried out. In each case the previous etch-pattern was removed by rubbing the surface with emery flour on the tip of the finger. It may be noted in passing, that this is an excellent method for freeing the surface of a specimen from [illegible] of oil or grease before etching the material.

2. *Chemical inhomogeneity.* One of the most useful purposes served by macroscopic etching is the revealing of chemical inhomogeneity, that is, variations in chemical composition due to segregation, cementation and similar causes. Figs. 4 and 5 illustrate the fact that etching with persulphate is usually sufficient to reveal such differences in composition.

The chemical analysis of the segregated specimen shown in Fig. 4 showed that the central and outer portions of the bar differed principally in the sulphur and phosphorus content. The percentages were as follows: phosphorus, outside 0.076 per cent, center, 0.138 per cent; sulphur, outside 0.029 per cent, center, 0.064 per cent. The appearance of the surface after deep-etching in hot concentrated hydrochloric acid and that after etching with ammonium persulphate are quite similar.

Fig. 5, shows a section of the head of a segregated rail which failed in service. The use of several of the common etching reagents is illustrated. The zone of segregation, which is largely due to sulphur as shown by Fig. 5a, is quite definitely indicated by the persulphate etching.

Fig. 6 shows a section through a low carbon steel rivet which holds together two plates of 3½ per cent nickel steel. Only by etching with ammonium persulphate was it found possible to reveal any of the "flow lines" within the rivet. These are faintly shown in the figure. Other macroscopic etching methods showed only a difference in shade of the rivet as compared with the plates, indicating thus that the two differed very considerably in composition.

Variations in structural condition due to local heating of parts of a steel specimen which may arise in such processes as welding, oxyacetylene cutting, etc., are also readily revealed by persulphate etching. Fig. 7 shows sections of the head of a steel rail to which a copper bonding cable has been welded at the side. The depth to which the metal has been affected by the heating is rendered plainly visible by etching with ammonium persulphate or with very dilute nitric acid.

Fig. 6—Macrostructure of riveted steel plates revealed by ammonium persulphate, actual size. The "work lines" in the interior of the rivet are faintly shown

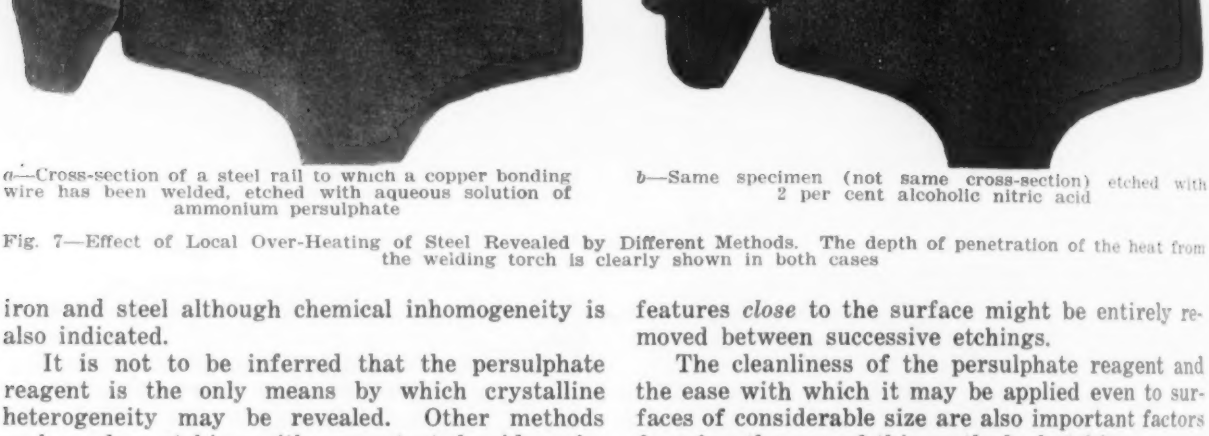
Discussion and Summary

It is evident from the foregoing discussion and

results that ammonium persulphate is a very useful reagent for revealing the macrostructure of iron and steel. Its action depends primarily upon the formation of acid and the liberation of oxygen from the spontaneous decomposition of the salt upon the addition of water. It is to be recommended particularly for revealing the crystalline condition of iron and steel although chemical inhomogeneity is also indicated.

It is not to be inferred that the persulphate reagent is the only means by which crystalline heterogeneity may be revealed. Other methods such as deep etching with concentrated acid, or by prolonged etching in dilute solutions, for instance, picric acid, will often reveal the same features. Such processes, however, are very tedious and time consuming and the face of the specimen becomes so roughened and pitted as to render it of no further value for examination without deeply grinding and repolishing the surface. In this way features *close* to the surface might be entirely removed between successive etchings.

The cleanliness of the persulphate reagent and the ease with which it may be applied even to surfaces of considerable size are also important factors favoring the use of this method of etching.



a—Cross-section of a steel rail to which a copper bonding wire has been welded, etched with aqueous solution of ammonium persulphate

b—Same specimen (not same cross-section) etched with 2 per cent alcoholic nitric acid

Fig. 7—Effect of Local Over-Heating of Steel Revealed by Different Methods. The depth of penetration of the heat from the welding torch is clearly shown in both cases

Effect of Zirconium in Cast Iron*

Elements Graded As to Oxidation—Effect of Temperatures—Results in Steel More Promising

BY DR. RICHARD MOLDENKE

TO the list of deoxidizers useful for the purification of cast iron there has been added another ferroalloy, that of zirconium. As the list of elements ordinarily in or added to cast iron grows larger a more thorough understanding of the functions of each one of them, particularly those more rarely met with, becomes of increasing importance. We are all familiar with the action of silicon, carbon, phosphorus, manganese and sulphur, but know very little about the special effects of vanadium, titanium, cerium, copper, nickel, chromium, etc. Year by year more of the rare elements come into daily use, and as they become more reasonable in price through quantity production, the iron industry experiences a corresponding expansion into new fields of usefulness.

Two Groups of Elements

For cast iron the elements involved seem to be divided into two groups. The first is made up of those not readily removed by oxidation in ordinary good foundry melting practice. The second consists of the elements readily oxidized under conditions involving the presence of oxygen in the molten metal. The two groups shade into each other to some extent, depending upon the degree of skill possessed by the foundryman in handling his cupola or furnace.

The above will be better understood when such elements as sulphur and phosphorus are considered. Both are increased in melting practice by concentration, as they are not oxidized out. Only the action of a basic hearth in open-hearth or electric furnace practice will reduce these elements in quantity, and only through chemical reactions of a more or less complicated nature. On the other hand, it is known that silicon and manganese undergo definite losses in the melting operation, and mixtures are made up with this situation in view. The behavior of carbon and iron itself is less certain. Both oxidize under conditions of high heat and the absence of a sufficiency of manganese and silicon to protect them. Most foundrymen have seen the brown smoke emanating from a cupola indicating a low bed and burned iron, when the silicon of the mixture was below 1 per cent and manganese nearly all gone. In air furnace practice the reduction of carbon is well known, and in long heats there is enough iron oxide in the bath to yield defective castings.

Grading Elements as to Ease in Oxidizing

For the group of the less easily oxidized elements in cast iron, where melting is carried on under the best possible conditions of air supply to the fuel to prevent undue oxidation, the following list may serve. It is thought that the order given may be that of the most stable first and so on to the middle ground. This order may be phosphorus, sulphur, iron, copper, nickel, tungsten, molybdenum and carbon. Then from carbon as ready to be oxidized or remain unaffected, depending upon the care taken in melting in cupola or furnace, the order of the elements readily oxidized may be carbon, chromium, zirconium, silicon, manganese, vanadium, aluminum, magnesium, titanium and cerium. The last-named is probably the one most easily oxidized.

The order above given is practically guessed at, as there is no definite information available on the subject. The writer has an intuitive feeling that it is so from the practical observations made when handling the elements in question in their ferroalloys. It would be interesting to subject iron alloyed with all of these elements to a very slow oxidizing atmosphere while in the molten state, and make continued analyses to observe the rate of elimination of each as the test progressed. This should give the order of removal and

*From a paper presented at the annual convention of the American Foundrymen's Association in Columbus, Ohio, Oct. 5.

by inference the degree of efficacy for purposes of deoxidation in cast iron.

From the many tests made by the author of deoxidizers of cast iron, it seems that the first effect is the removal of oxygen present in combination with the iron. This eliminates just the amount of the element in question necessary for that laudable purpose. If the alloy added brings in more than enough for this deoxidation, the balance of the element remains in the cast iron and exerts its particular function upon the properties of the casting. Thus, the addition of say 0.1 per cent titanium may remove all the oxygen present in a ladle of molten iron and yield results that are practically as good as if 0.2 per cent titanium had been used. It is the removal of oxygen—the weakening factor in the molten metal—that permits it to come out with its natural strength due to its composition. It seems as if the crystals adhere more firmly and are given the chance they should have for strength due to a good analysis. If these crystals are of finer quality as the result of added nickel or molybdenum, and if the graphite crystals are small and not too large in number, the product should be a pretty high class metal. Many claims are made for vanadium and other of the rare elements for cast iron and doubtless there is much to the subject. Fundamentally, however, the less oxygen present in the metal before the ferroalloy addition, the more characteristic the effect. Hence the soundness of the policy of devoting every attention to good melting practice so that but little of an expensive alloy need be added to attain a desired effect.

Effect of the Temperature

One of the difficulties found with the deoxidation of cast iron is the degree of heat involved. It is well known that the hotter the metal the better the effect of manganese added to heats with high steel percentages. Indeed, to get a high steel scrap heat safe for pouring molds, it is necessary to use a good fuel percentage. The higher actual temperature of the molten metal resulting promotes the union of oxygen and manganese, and the result is a casting free from blowholes. With ordinary cast iron the added manganese, instead of going into the slag, will be found in the metal; possibly partly in combination with sulphur, but having exerted little or no deoxidizing effect. The temperature was not high enough for the reaction.

The consequence of the above is that such metals as aluminum, cerium and magnesium are easily taken up in molten cast iron, whereas titanium and zirconium take more time and heat for the best results.

Large Zirconium Percentage Chills

In making tests with ferrozirconium, an alloy containing 30.6 per cent zirconium was used. It was noticed that for the smaller percentages the metal behaved nicely in melting and indicated a purifying action, for the slag came up and collected for easy removal. The larger percentages gave more trouble and chilled the metal considerably so that it was difficult to pour successfully. Unquestionably the alloy will do better service in steel than in cast iron.

Two sets of transverse tests were made. One with a gray iron mixture and the other with car wheel scrap, thus obtaining results for gray and for white iron.

Gray Iron Mixture

Pig 60 per cent and gray scrap 40 per cent. Average of three bars each.

Breaking Strength in. Lb.	Deflection in Inches	Zirconium Added, Per Cent
2,700	0.10	None
2,920	0.11	0.05
2,900	0.11	0.10
3,050	0.11	0.15

White Iron Mixture

Scrap car wheels, 60 per cent; white iron scrap, 40 per cent. Average of three bars each.

Breaking Strength in. Lb.	Deflection in Inches	Zirconium Added, Per Cent
2,640	0.10	None
2,790	0.10	0.05
2,880	0.11	0.10
2,940	0.11	0.15

As the usual element addition for deoxidation purposes is 0.10 per cent it will be noticed that the strength increase is 6 and 9 per cent respectively. Undoubtedly where large steel scrap percentages are used, this increase will be greater as the oxidation will have been more serious and the temperature of the molten metal higher, making for a better reaction. Further tests in this direction would seem advisable, for the world's supply of zirconium is quite extensive and it should be converted to the ferroalloy as cheaply as titanium.

The above data are given at this time in order that those who are interested may be advised. The tests were made over a year ago.

ROLLING MILL THEORY

Lack of Knowledge Emphasized in a Paper by Professor Trinks

A paper on the theory of rolling, notable for its lucidity, was recently presented by W. Trinks, professor of mechanical engineering Carnegie Institute of Technology, Pittsburgh, before the Engineers' Society of Western Pennsylvania. Incidentally he emphasized the need for more extended knowledge among rolling mill engineers about the underlying principles of plastic flow.

Flow, he pointed out, takes place in the direction of greatest shear. For a given condition of the material the velocity of flow is proportional to the difference between actual shearing stress and yield point shearing stress. That rolling below a certain speed saves in power is well known, the author added, and also that it produces better steel, because the stresses caused by slow deformation of viscous solids are less than those caused by quick deformation. The amount of deformation permissible is unlimited providing the material is always under compression from all sides. Every material, however, has a critical temperature below which it is hardened by deformation (cold flow) and above which it is not hardened (hot flow). Since most of the rolling mill deformations are by hot flow, the speaker said, there is no limit to the deformation without injury to the material if tension be avoided, but tension can hardly ever be avoided in rolling. The effect of tension is measured by the unit of specific elongation which accompanies it.

The amount of unit elongation which is allowable in rolling varies with the quality of the material, with the ratio of absolute rolling temperature to absolute melting temperature and with the velocity of elongation.

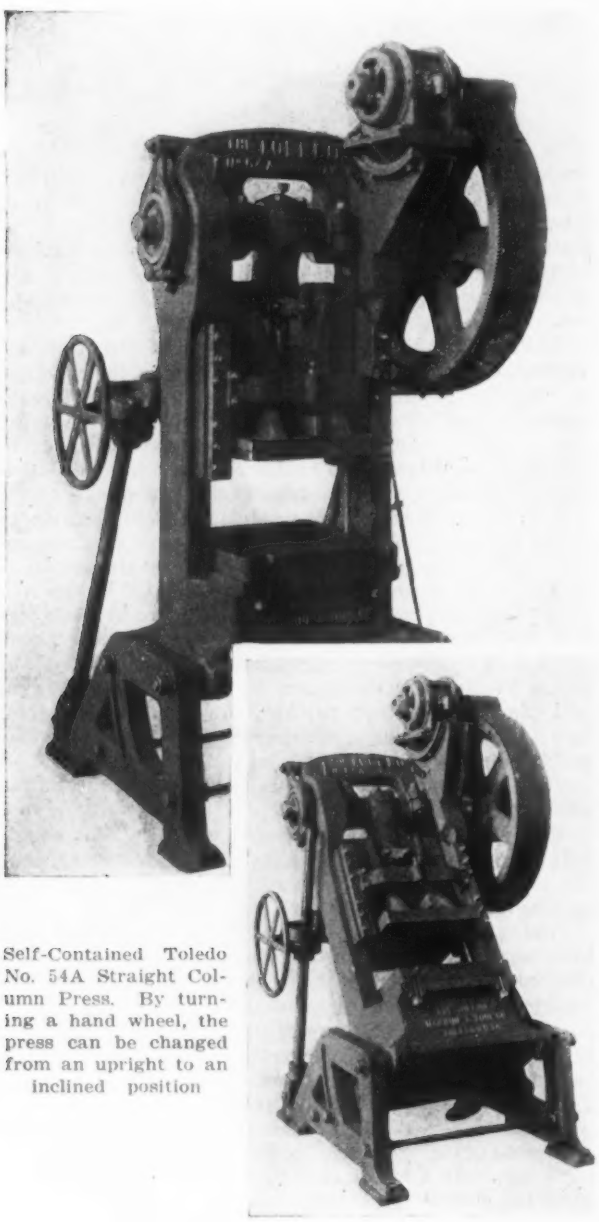
There is a great confusion of ideas, Prof. Trinks asserted, regarding the forces that flow between the steel and the rolls. Most people think, he stated, that the steel is "pulled through the rolls" with great force. As a matter of fact, there is very little if any pulling action. If the speed of the mill changes, as in reversing mills there is a horizontal force component. There also exists such a component when a piece first enters the mill. While being accelerated a small though negligible horizontal component is present.

While it is a comparatively simple matter to determine the direction of the resultant force between the steel and the rolls, it is absolutely impossible to determine the distribution of the force elements of which the resultant force is built up, asserted the author. In by far the greatest number of cases of rolling, there is slippage between the steel and rolls. For that reason, the distribution of forces in the rolling process is quite different from the distribution which establishes itself when steel is compressed between the platens of a press.

In attempting to determine the line of action of the resultant force, Prof. Trinks pointed out, we find how little we really know about the distribution of forces in the mill. This cannot be determined from the work per revolution unless the pure rolling work can be separated from the neck friction work and this to the author's knowledge has never been experimentally accomplished. Variable friction also makes predetermination of the work requirements uncertain. While we must admit the present day hopelessness of a mathematical theory of plastic deformations, we can do a great deal by careful, analytical reasoning, Prof. Trinks declared.

Press Which Is Inclinable

A straight column press which may be used in either an upright or inclined position by simply turning a hand wheel has been designed and built by the Toledo Machine & Tool Co., Toledo, Ohio. It is self contained, being driven by a direct-connected electric motor. Special attention is called to the motor bracket, which is arranged to keep the motor in a vertical or upright position, no matter whether the press is upright or inclined to any angle within its limits. The pinion is always in mesh.



Self-Contained Toledo No. 54A Straight Column Press. By turning a hand wheel, the press can be changed from an upright to an inclined position

It is pointed out that the distance between the uprights is somewhat greater than is ordinarily furnished on a press of this size. The slide is of liberal proportions, and is carefully guided in gibs, to insure the accuracy required by manufacturers of electric motors, electrical instruments, etc.

The press may be furnished with or without gearing, and with or without the bar knockout in the slide and the direct connected lower liftout, as well as with or without the motor bracket. The press is also built with the frame arched out from front to back and with an opening 14 in. wide in each housing to permit of feeding the stock from right to left or vice versa.

The press as shown in the accompanying illustrations weighs about 6500 lb. The principal dimensions are: Area of the bed, front and back, 24 in., and right to left, 23 in.; area of slide, front to back, 21 in., and right to left, 19½ in.; opening in bed, 12 x 12 in.; distance between housings, 24 in.; stroke of slide. 2 in.: distance bed to slide, stroke down and adjustment up, 13 in.; thickness of bolster plate, 3 in., and weight of flywheel, 1050 lb. Some of the above dimensions the manufacturer advises can be changed to suit special requirements.

Auto Parts Manufacturing Company Formed

The W. E. Seymour Mfg. Corporation, Milwaukee, Wis., has been incorporated at $200,000 to make auto parts, chiefly piston rings. The executive officers are W. E. Seymour, president; J. A. Lee, vice-president and general manager; M. L. Buckley, secretary; C. J. Gilbert, treasurer, and E. E. Hirschhauter, chief engineer. Mr. Seymour has long been identified with the automobile industry. He was for six years works manager of Fairbanks, Morse & Co., Beloit, Wis., recently vice-president and general manager of the A. O. Smith Corporation, severing his connections to form the company bearing his name. Mr. Lee has established himself in the automobile industry as production engineer. E. E. Hirschhauter was interested in automotive engineering in France, and has been active in the automobile engineering of large manufacturers in this country. The new company has purchased a manufacturing plant at Lisbon Avenue and Thirty-first Street, Milwaukee. The buildings are light and airy and include a spacious machine shop and foundry. Options on adjoining property have been taken. Production will begin the latter part of November or early in December. Temporary offices are at 266 Plankinton Arcade, Milwaukee.

Sloss-Sheffield Storage Yard

The Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., plans to establish a permanent pig iron storage yard at Providence, R. I., on the municipal wharf, where a stock of foundry iron of at least 5000 tons, various silicon, will be maintained regardless of general business conditions. The plan has been in process of development since June, since which time considerably more than 12,000 tons has been unloaded at that port.

Barges were first employed to transport the iron from Southern ports to Providence, but subsequently the steamer Maruba was chartered, which makes two trips per month. The barges operate a week or so apart. Steel dumping buckets, with guy rope tilts, are used for unloading at Providence, but the company expects to install at an early date a 52-in. Cutler-Hammer lifting magnet, circular type, for this purpose. Improvements will be made at a Southern loading port whereby the cost of handling iron there also will be materially reduced. W. J. Breen & Co., Boston, acts as pig iron representative of the Sloss-Sheffield Steel & Iron Co.

Heavy Manganese Imports in August

Imports of ferromanganese in August, this year, were 9804 gross tons, or the largest for any month this year and for several years. The total to Sept. 1 is now 33,515 tons, as compared with 16,994 tons to Sept. 1, 1919, or practically double. The exports in August were 252 tons, making the total to Sept. 1, this year, 1186 tons, as against 1980 tons to Sept. 1, 1919.

Manganese ore imports also made a new record for the year in August at 99,601 gross tons. The total for the eight months to Sept. 1 is now 334,590 tons, as against 249,810 tons to Sept. 1, 1919.

Tin plate is now being transported down the Ohio River from the Pittsburgh district for transshipment to South American countries. The steamer General Beach brought several hundred tons from Pittsburgh to Cincinnati, where it was loaded on cars for New Orleans, and later transferred to ships for the remainder of the voyage to San Tauos, Brazil.

The Iron Trade Products Co., Farmers Bank Bldg., Pittsburgh, has been appointed exclusive sales agent for the coal, furnace and foundry coke output from the properties formerly belonging to the Westmoreland Gas Coal Co., but now belonging to J. L. Kendall.

Safe Practices in Blast Furnace Operations*

Gas Most Serious Hazard—Need of Care in Use of Helmets—Hot Metal and Cinder Burns—Skip Hoist Cause of Accidents

BY L. A. TOUZALIN†

ALL blast furnace men will undoubtedly agree that the most serious hazard in connection with the operation of iron blast furnaces is the handling of blast furnace gas. While it is true that the improvements made in blast furnace construction and operation during the last ten years have largely reduced the necessity for workmen to come into contact with furnace gases, these very improvements, to a certain extent, have made the gases more treacherous and dangerous to the operating crew should they come into contact with them. In the days of hand filling, the top fillers were apt to consider a gas headache as a normal condition under which their work was to be done. The men were brought down from the tops and scattered along the cast house gangs with the replacement of hand filling by the automatic skip hoist. Shortly after this new development, the use of washers for cleaning the gas was inaugurated, and when these same "gas eaters" encountered their old friend in a cold, wet and clean condition they received a severe shock. They suddenly discovered that their former boast of "knowing when they had enough gas" was no longer applicable. They had simply to take a whiff or two and presto! they were out of business.

Gas Hazards at Resumption of Operations

One of the greatest gas hazards is the seepage of gas through furnace walls, foundations and surroundings whenever a banked furnace resumes operation. At such times gaseous areas will accumulate in most unexpected locations, and too much emphasis cannot be laid on the importance of the most rigid watchfulness at this time. At South Works our experiences during the past two years of alternate banking and "blowing up" have resulted in the following method of procedure under such conditions: Just before blowing up, two or three of our practice men are sent out to gather the men into groups and to explain that the furnace in question is about to resume operation. Each man is instructed to watch his fellow workmen. The blower assigns a partner to each man whose presence somewhat near the furnace is necessary, and these men are instructed to watch each other for any symptoms of the effects of gas. Patrols, in pairs, are placed at safe distances from the furnace and at locations that enable them to see and prevent anyone approaching the furnace from any direction.

Many accidents have resulted and many lives have been lost by men working in a furnace or in its gas equipment when such furnace was out of blast and disconnected from other furnaces by a water seal only. In unaccountable ways the water has been lost at the seal or violent slips on other furnaces have blown enough gas through the seal to cause serious trouble. The only positive means of preventing such accidents is the ironclad law prohibiting any individual or group of men, under ordinary operating conditions, from working at any location in a furnace, dust catcher, washer, dryer, water seal, or any part of the furnace equipment where he is protected solely by a water seal. When such work is to be done the furnace in question should be protected by a plate or goggle valve. This positive means of protection becomes very simple if water seals with adjacent flanges for plate valves are installed just beyond the dust catcher and just before the clean gas main.

At South Works each of our eleven furnaces is now so equipped and it is possible to shut off any individual furnace by first filling a water seal and then turning a goggle valve or inserting a plate on the dead side of this seal. Under extraordinary conditions, occasions may arise when it is necessary to send a man into a place protected by a water seal only, but in such cases the man doing the work should either wear a gas helmet, or where impossible to enter so equipped, should have a life line securely tied about himself, and extended to a safe location outside of the manhole.

The ordinary manhole provided in dust catchers, washers, gas mains, etc., is of such size that a man under normal conditions can just about squeeze through. It is an exceedingly difficult task to get a man through the hole if he is in a partial or completely unconscious condition. In all future construction manholes should be made large enough to freely admit a man fully equipped with a gas helmet apparatus.

Provision is made on all of our furnaces for inserting a goggle or plate valve in the main when a furnace is to be relined, banked or down for repairs, as mentioned above. In some cases, however, the necessity might arise for repairs to be made at some point in our gas main where such provision cannot be made. In such a case when men are working behind a water seal only, it is our practice to have the water seal carefully inspected regularly, the inlet and overflow outlet, water valves locked with safety locks, and the bottom discharge valve securely blocked or locked. We believe that these precautions carefully followed will adequately protect men while working in such locations. Where provision is made, it is our practice to insert the goggle valve or plate when men are going in a main, and to have the water seal also full as an extra precaution.

Care of Gas Helmets

From a safety, as well as an operating standpoint, every blast furnace plant should have an up to date, self-contained, breathing apparatus equipment, but it must be borne in mind that the most efficient gas helmets made are only safe when they receive constant attention in keeping up the equipment and when worn by men who have been thoroughly trained until they feel absolutely familiar with the apparatus. The responsibility for maintaining our gas helmets in first class condition was at first put up to certain men in each branch of the department, but this plan did not prove a success and for the last two years we have had one man whose sole duty it was to keep our 21 gas helmets in first class condition at all times, and to take charge of training our helmet squads.

Our breathing apparatus is housed in wooden cabinets with glass panel doors. These cabinets are of sufficient size to allow each set of apparatus to be hung at the height of a man's shoulders. They were designed with two purposes in view: First, to make the apparatus accessible and ready for instant use of inspection; second, to protect the apparatus from dust. The apparatus is hung completely assembled with the exception of potash cartridges, which are kept on a shelf immediately above the helmet.

When a man desires to use a helmet for relief or emergency work, he inserts a new potash cartridge and, after putting on the apparatus, tests it thoroughly for leaks. If he desires to put on the helmet for practice work only, he uses a potash cartridge which has been previously used for this purpose, and is sealed with rubber stoppers. Our helmet man systematically inspects each helmet once a week. If the helmet is in first class working condition he attaches a seal, and should this seal be found broken at any time it is an indication that the helmet has been in use since his last inspection. A written report is filled out after each

*Abstract of address delivered before National Safety Council Congress at Milwaukee, Sept. 27 to Oct. 1.

†Assistant Superintendent Blast Furnaces, South Works, Illinois Steel Co.

inspection and a copy submitted to the assistant superintendent in charge of that particular department.

Before the war it was difficult to instill confidence of the workmen in gas helmets, but the trench helmets used for gases other than carbon monoxide received so much publicity in our newspapers during the war that men have lost, to a great extent, their fear of them. Each of our departments has a helmet squad consisting of men who have been examined by the company physician and thoroughly trained in the use of the equipment by our helmet man. This squad is made up of day and night men and at least three are always on the job on either day or night turn at each group of furnaces. A siren is blown in case of any gas emergency and all helmet men immediately proceed to the nearest helmet station and prepare to enter the gaseous area.

Drills are frequently held, and several times during the past year certain men in the relief squad have been told to hurry to the office, get on a helmet and rescue a man from the bustle pipe of a furnace. When the relief man arrives at the bustle pipe he finds the foreman lying down beside a bag of sand. The foreman then directs him to lower the bag carefully to the ground. The best record made so far is a total of 5½ minutes from the time the man started to the office for his helmet until the bag of sand touched the ground below the bustle pipe. The furnace in question was located about 500 ft. from the office.

One of the most recent developments in appliances to assist in overcoming the hazards of blast furnace gas is the appearance of a new carbon monoxide detector, which I note will be discussed by a later speaker. It may be stated that should this instrument be found practical and positive it will fill a long felt want in blast furnace practice.

Hot Metal and Cinder Burns

Considering the next serious hazard after gas, we come to hot metal and cinder burns. Here again emphasis must be laid on the importance of safety thinking. And a safety thinking workman thinks for the other fellow as well as for himself. The best evidence of safety thoughtfulness in an organization is the care and advice which older furnace men bestow on new employees in regard to safety precautions. In these days of great labor turnover this lack of watchfulness of the older men over the less experienced may be the cause of many accidents.

Several devices have been brought into use during the last few years to counteract the hazard of burns around blast furnaces. Among the most important of these may be mentioned the Bates cinder notch stopper, the Berg automatic mud gun and the Mullin tapping machine. At South Works we are at present installing the Bates cinder notch stopper on our furnaces as they are relined, and our experience with this device so far promises good results. Like all new equipment, it will require months of use to obtain the confidence and appreciation of the men.

Two devices which have recently been put into use in our plant and which tend to cut down burns from splashing and sparking at the iron notch are a chain screen which is lowered in front of the hole at the end of the cast and through which the mud gun muzzle is inserted to stop the hole, and a splasher plate which is raised above the trough, and swung away from the hole at the end of the cast, by one man, operating a hand wheel, at a safe distance from the furnace.

The keeper, first helper, and cinder snapper of each furnace are required to wear safety leggings whenever the iron or cinder is running, that is, at flushes or casts. These leggings were unsatisfactory as originally purchased on the market, but with some few changes to make them lighter and more flexible are now well thought of, and freely used, by our furnace men. Wire masks are sometimes used by the keepers when they close up the hole. These do not impede the vision and are preferred by our men over goggles. Two other devices which tend to cut down burns in our cast houses may be touched upon. One is the arrangement of sheaves and cables which are used to pull all shutters from a safe distance, thus making it possible for the man doing this to keep out of range of sparks or shots of iron. The other is the heavy cast iron bridges which are conveniently located at several points along the iron and cinder runners. These bridges make it possible to cross the runner without danger of stepping or falling into the stream of molten metal or cinder.

Mechanical Hazards

Taking up next the mechanical hazards, the skip hoist undoubtedly stands first as the source of accidents. It is true that the use of safety locks, rigidly enforced, has done much to overcome the great element of danger due to the possibilities of men being run over, crushed or caught by moving parts, but in spite of this safeguard, near accidents have demonstrated the necessity of some method of quick control to check the movement of the skips, should a man be found to be in danger. In order to take care of this condition we have installed safety switches, readily accessible to anyone standing at the side of the skip pit, so that by simply throwing a switch the power is cut off and brakes automatically applied to the hoisting machinery.

As our furnaces are relined all skip inclines are covered, on the bottom and sides, with steel plates to prevent injury to those below from falling material.

Owing to the compact construction of stock houses, serious collisions have occurred between scale cars where one car happened to be stationary under breakdown repairs, and the other operating. Men working under the stationary car have been injured from the resulting shock. In order to prevent such occurrences, our stock houses are provided with suitable skids which are placed on the rails at a safe distance from each end of a car under repairs to protect the car.

The usual form of snorting valve used to by-pass the cold blast into the atmosphere, when it is desired to take the wind off the furnace and the blow-off valves, which are operated to release the pressure from stoves taken off the furnace and put on gas, have given blast furnace plants the reputation of being the greatest noise producers in steel mills. It is safe to predict, however, that within the next few years blast furnace plants will be operating as silently as any other department of the mills. Patent blow-off valves are now on the market which permit the discharge of air from three-pass stoves to be directed into the stacks. The muffling of two and four pass stoves is easily accomplished by connecting the blow-off valve directly to the draft flue. The snort valve may be muffled in the same way, that is, by connecting the outlet to the draft flue. Both of these plans are at present in use at South Chicago, and we believe that the elimination of these violent noises is conducive to greater safety to the operating force, not to mention the prevention of partial or complete deafness of the man whose duty it is to operate these valves.

Kelly Reamer Co. in New Home

The Kelly Reamer Co., Cleveland, recently moved into its new plant at 3705 West Seventy-third Street, that city, and its shop committee held a house-warming party on Oct. 9. Features of the plant are extra heavy vault space to care for both the company's and customers' drawings, improved machinery and equipment for producing high grade tools of this nature. It is located in the new manufacturing district at the southwest side of the city, and when city improvements are completed it will have two sides facing on a wide boulevard with good street car service over the West Denison and West Seventy-third Street lines, and fine approach for auto traffic.

Ornamental Iron and Bronze Manufacturers

The thirteenth annual convention of the National Association of Ornamental Iron and Bronze Manufacturers will be held at the Adelphia Hotel, Philadelphia, Oct. 18 and 19. Speakers of note will address the convention upon the subjects of industrial engineering, overhead and cost accounting, industrial relations, labor conditions, and other matters which are of great interest to the industry. The annual dinner will be held at the Philadelphia Yacht Club on the evening of Oct. 18, following an automobile tour through the ship building plant at Hog Island.

Electric Smelting of Montana Manganese*

Practice of the Anaconda Copper Mining Co. in Making Ferromanganese — The Furnaces and the Charge

BY E. S. BARDWELL

DURING the year 1918 there was produced in the United States 304,366 gross tons of manganese ore, containing over 35 per cent manganese. Of this amount Montana alone produced 199,932 tons, or over 65 per cent of the total. Practically all of this ore came from the Philipsburg and Butte districts. The armistice caused an immediate curtailment of manganese mining in Montana, owing to the ability of the eastern steel plants to again secure supplies of manganese ore from foreign sources. The manganese production of the State of Montana in 1918 was greater than the total imports to this country for the year 1911, and would represent a substantial percentage of this country's normal requirements.

In view of these facts, the importance of this potential source of manganese cannot fail to be recognized, and a discussion of the problems arising in the smelting of these ores in the electric furnace should be of interest.

Character of Ores

The Montana ores are low in phosphorus and iron and admirably suited for the production of 80 per cent ferromanganese. In the Butte district the Emma mine is the chief producer. The output of this mine during the war reached a maximum of 10,000 tons of rhodochrosite ore a month, the greater part of which was shipped to eastern consumers. A typical analysis is as follows:

	Per Cent		Per Cent
Moisture	2.61	MgO	2.61
MnO	46.87	BaO	0.00
FeO	2.68	CO_2	33.56
SiO_2	6.19		
Al_2O_3	1.18		95.70
CaO	0.00	Undetermined	4.30
		Total	100.00

The Philipsburg ores differ from those of the Butte district in that they are higher in silica and contain manganese principally in the form of the psilomelane, a hydrated oxide of manganese of more or less indefinite composition. An average analysis is about as follows:

	Per Cent		Per Cent
Moisture	9.73	MgO	—
MnO_2	50.10	BaO	—
MnO	3.83	Loss on ignition	12.80
Fe_2O_3	2.90		
SiO_2	18.07		99.44
Al_2O_3	2.01	Undetermined	0.56
CaO	—		
		Total	100.00

By washing it is possible to reduce the silica content of the Philipsburg ores to at least one-half the percentage stated above, with a corresponding increase in manganese content.

Electric Furnace Plant at Great Falls

During 1918 the Anaconda Copper Mining Co. erected at Great Falls, Mont., an electric furnace plant capable of producing 90 tons daily of 80 per cent alloy. The first of five furnaces was started in September. Three furnaces were ready for operation at the time the armistice was signed, shortly after which time operation ceased, due to lack of market for the product.

The furnaces consist of an open-top, shallow brick shaft 28 x 14 x 9 ft. (8.4 x 4.2 x 2.7 m.), outside dimensions. The outer walls are of red building brick, with an inner firebrick lining. The shaft has a tamped lining composed of dead-burned magnesite, with pitch as a binder. The tamped lining is 3 ft. (90 cm.) in thickness at the bottom of the crucible, and is brought up the sides to a point about 18 in. (45 cm.) above the tap-hole level. Cooling pipes are provided in the bottom, through which air for cooling is circulated. The inner dimensions of the crucible at the middle section are 22 x 9 ft. (6.6 by 2.7 m.) by 6 ft. (1.8 m.) deep. The furnaces are operated on 60-cycle, 3-phase alternating current. Two 24-in. (60 cm.) round amorphous carbon electrodes are used in a common holder on each phase. The electrodes are spaced 3 ft. (90 cm.) between centers in the holders and the pairs about 5 ft. (1.5 m.) on centers.

The holders originally provided were discarded on account of mechanical difficulties and another very simple holder devised. This holder is made in two entirely independent halves held together by pins and wedges. The long fish-tail cast integral with the holder makes it possible to avoid bringing cables out over the furnace, where they will be subjected to the hot gases. Water-cooling is brought about by a coil of pipe properly formed and cast in. The water connections for each half are independent. The holder is supported by yokes, which serve to keep the chains used for raising and lowering the holders up out of the heat. The winches for raising and lowering the electrodes are placed upon the bridge supporting the holder and electrodes, which bridge is insulated from the furnace superstructure by means of vitrified brick interposed between it and the superstructure.

No trouble was experienced from failures of insulation during the time the furnaces were operated. The holders themselves were cast in sand molds from phosphor-copper, and required practically no machine work. We found the contact surface ample and the holder sufficiently flexible to take care of the inequalities in size often existing between the two electrodes in the holder. A loosely fitting sheet steel sleeve was provided to slip down over the electrode. This rested on top of the holder and prevented the electrode being eaten away above the holder by the hot gases.

When slipping electrodes the wedges were easily loosened, the holder raised and again clamped. The time required for slipping electrodes was not over 10 min. No attempt was made to protect the electrode exposed between the holder and the charge, except to keep the holder as close down to the top of the charge as was feasible.

The substation from which electrical energy is supplied is located immediately back of the furnaces. It receives power at 110,000 volts from nearby hydroelectric plants of the Montana Power Co. Two 12,000 kva. General Electric transformers serve to reduce the voltage from 110,000 to 6600 volts, at which voltage it is delivered to the furnace transformers. Each furnace is equipped with one General Electric polyphase transformer rated at 5630 kva., provided with taps on the high tension side for 85, 100, 115 and 130 volts. The furnaces were operated with a no-load voltage of 115 volts. The average input under these conditions was 3600 kw. The power factor was about 80 per cent.

The operating panels are arranged in a gallery overlooking the furnaces. Provision is made for either hand or automatic control. The automatic regulators are of the General Electric type originally designed to operate on current. We found it advantageous, however, to keep the voltage on the separate phases balanced rather than the current, and the necessary alterations were made in the apparatus to enable us to regulate on the voltage between phases and ground. With this change the automatic control proved highly satisfactory, holding the load constant under all conditions met with in operation, with very little attention on the part of the operator.

The weighing and mixing division is so arranged that four operators can, in one shift, weigh and mix

*From a paper presented at the fall meeting of the American Electrochemical Society in Cleveland, Sept. 30. The author is metallurgist Anaconda Copper Mining Co., Great Falls, Mont.

sufficient charge to keep five furnaces in operation for 24 hr. This would hardly be feasible were the plant treating a large variety of ores, but given a constant supply of ore of a uniform grade, little or no difficulty has been experienced.

The Furnace Charge

The mixed charge is delivered by belt conveyors to the mixed charge bin whence it is taken in boats by the crane and dumped into charge hoppers at the furnaces. The charge consists of ore, lime-rock, coal, coke and iron ore. The only manganese ore treated at Great Falls is the Butte rhodochrosite ore from the Emma mine. The charge treated was as follows:

	Lb.	Kg.		Lb.	Kg.
Ore	500	227	Coke	50	23
Lime-rock	90	41	Iron ore	12	5.5
Coal	100	45			

When the furnaces were first started coal only was used as a reducing agent. We soon found, however, that owing to the fact that the rhodochrosite decrepitates when heated, this gave us too compact a charge. Primarily to do away with this difficulty, we substituted for a part of the coal an equivalent amount of blast-furnace coke based, of course, on the relative fixed carbon content of the two materials. With this change the furnace operated very smoothly, with only occasional boils. Coke alone was tried, but with this we could not keep the electrodes down in the charge. The proportions of coal and coke indicated above were finally determined upon as being the best under our conditions. The furnaces are tapped at intervals of about 1½ hr. The slag and metal run into ladles, the slag is skimmed into the slag sluice and the metal cast by machine.

The plant was operated for such a short time and under such adverse conditions that it is impossible to give accurate metallurgical results. The results were on the whole, however, satisfactory. The loss by volatilization was not over 15 per cent, and the recovery of manganese in the alloy between 75 and 80 per cent.

Electric Furnace Test on Montana Ores

Materials: The ore used in the test about to be described consisted of a half-and-half mixture of ores from the Philipsburg and Butte districts. This material was very carefully bedded, sampled and analyzed. The analysis of the mixture gave results as follows:

	Per Cent		Per Cent
Moisture	5.03	CaO	0.00
MnO_2	23.92	BaO	0.03
MnO	26.37	MgO	1.15
FeO	1.14	CO_2	16.67
Fe_2O_3	1.40	Combined H_2O	6.43
SiO_2	13.48	Undetermined	2.43
Al_2O_3	1.95		
		Total	100.00

Coal was used as a reducing agent. [The analysis is given in the paper.] As flux, a very pure marble was employed. This contained 55 per cent CaO and 43.2 per cent CO_2. It was necessary to add iron in order to make 70 per cent ferromanganese. The iron was added in the form of turnings, which were not analyzed, but which, for the purpose of the test, we assumed to contain 100 per cent iron.

The Furnace: The furnace upon which this test was conducted was of the rectangular open-top type. It consisted of a steel shell 18 ft. x 9 ft. x 6 ft. 8 in. (5.4 x 2.7 x 1.9 m.) outside dimensions, with carbon lining approximately 30 in. (75 cm.) thick at the bottom of the crucible and 18 in. (45 cm.) on the side walls. The transformer equipment consisted of three single-phase Pittsburgh transformers, each rated at 667 kva. and connected △/△. These transformers were provided with taps for 65, 75 and 85 volts, and during the test were operated at no-load voltage of 75 volts. Three 24-in. (60 cm.) round amorphous-carbon electrodes were used in water-cooled top holders. Motor-operated winches served to move electrodes up and down, but the furnace was not provided with automatic regulators. The furnace was tapped at intervals of about 1¼ hr. The slag and metal were allowed to flow together into sand pits, where they solidified and were then removed to the yard, where the slag was separated and metal weighed and loaded into cars for shipment.

The Charge: The furnace charge was varied slightly from time to time during the test, but was substantially as follows:

	Lb.	Kg.		Lb.	Kg.
Ore	500	223	Lime-rock	90	41
Coal	150	68	Turnings	30	14

This charge gave an alloy containing 70.9 per cent manganese. The coal is, however, too high and the lime-rock too low for best results. A method for calculating the charge will be given later on.

Balance Sheet: The furnace was operated on the above charge for a period of 274 hr., during which time a total of 501,000 lb. (227,700 kg.) of the ore mixture was smelted, yielding 186,419 lb. (84,730 kg.) of metal containing 70.9 per cent manganese. The slag from the furnace was kept separate from the slag resulting from other furnace operations, and was weighed, sampled and analyzed. [The complete balance sheet and the calculation of theoretical power equipment are given in the paper.]

During the test there were produced 93.2 tons of ferromanganese. The theoretically required power is:

$$\frac{328{,}000}{93.2} = 3{,}520 \text{ kw. hr., or } 3{,}500 \text{ kw. hr. per net ton.}$$

and the percentage heat distribution:

	Per Cent Total Heat Required
Reduction of manganese	40.1
Reduction of iron	1.8
Reduction of silicon	12.8
Calcination of $CaCO_3$ and $Mn\ CO_3$	15.1
Distillation of volatile from coal	4.5
Expulsion of moisture	4.9
Sensible heat in gases	4.3
Sensible heat in slag	7.6
Sensible heat in metal	8.9
Total	100.0

From the data it would at first appear that considerable saving might be effected by calcining the ore and lime-rock previous to charging the same into the furnace. This assumption, however, does not seem to be borne out in practice. The greater part of the work of calcination is brought about in the upper part of the charge column, utilizing heat which would otherwise be lost. Some economy of operation should, however, result, and the practicability of the operation should be carefully investigated.

From the above computation we are enabled to compute the heat efficiency of the furnace tested to have been 71.7 per cent. This figure is very good for a furnace of the size upon which the test was conducted.

The heat loss is due, of course, in part to radiation of heat from the furnace itself and in part to I^2R losses. A test carried out on a similar furnace showed 40 per cent of the heat loss to be due to radiation and 60 per cent to the I^2R losses. Of this 60 per cent the following distribution may be made:

	Per Cent
Transformers	17.5
Conductors	30.0
Electrodes	15.0
Contacts	37.5
Total	100.0

The above analysis gives us, I think, a very comprehensive idea of the heat requirements of an electric furnace producing ferromanganese. Due to lack of accurate data certain assumptions had to be made in computing the theoretically required power, but the result obtained is sufficiently accurate for all practical purposes.

The Slags Produced

In studying electric furnaces producing ferromanganese my attention was called to the great variety of slags produced. It seemed worth while to investigate the question of slags with the idea in mind of seeing whether or not means could be found to calculate a charge which would give us a slag of low manganese content. From a considerable number of samples, eight typical slags were selected and carefully analyzed.

No. 1.—A hard gray slag containing ferromanganese inclusions.

No. —A medium green hard slag with few if any metal inclusions.
No. —A dark green hard slag with little in the way of inclusions.
No. —A high-lime air-slaking slag.
No. —A high-lime air-slaking slag.
No. —A light-grey glassy slag.
No. —A light-green hard slag.
No. —A light pea-green hard slag.

Table of Analyses of Slag Samples

	1	2	3	4	5	6	7	8
SiO_2	28.2	31.5	26.6	34.4	22.4	30.9	31.9	32.9
FeO	1.2	0.7	1.0	0.1	0.1	1.1	1.3	0.8
Al_2O_3	17.3	8.0	9.6	7.7	6.8	10.0	10.1	8.7
CaO	41.4	35.7	31.1	42.2	46.8	37.8	35.3	36.0
MgO	7.6	1.8	1.1	1.8	4.0	10.2	10.4	2.1
BaO	0.4	1.3	4.8	1.1	0.2	0.2	0.3	1.2
Mn	2.1	14.5	19.9	8.1	5.3	4.7	5.8	12.2
Total	98.2	93.5	94.1	95.4	85.6	94.9	95.1	93.9

It will be noted that in this collection we have two types only as regards their physical condition: Hard slags and air-slaking slags. The reason for the slags air-slaking is that the composition is such that calcium ortho-silicate, $2CaO.SiO$, separated as one of the phases. The ortho-silicate crystallizes in three distinct forms, the *alpha*-form, stable above 1410 deg. C. to the melting point, the *beta*-form, stable between 675 and 1410 deg., and the *gamma*-form, stable below 675 deg. C. The transformation of the *beta*-orthosilicate into the *gamma*-form is accompanied by a 10 per cent volume increase. It is this volume increase, therefore, that accounts for what I have termed the air-slaking of slags, Nos. 4 and 5. The presence of much magnesia in the slag tends to prevent this latter transformation.

Manganese occurs in the slags in three ways: First, as ferromanganese inclusions; second, as manganese silicate; and third, as manganates or manganites of calcium or in some cases as oxides of manganese in solution in the slag. Any slag that is insufficiently fluid will contain more or less in the way of ferromanganese inclusions. Lack of sufficient carbon to reduce the manganese will, of course, promote the formation of manganates and manganites. Excess silica seems to tend to form silicates even when sufficient carbon is at hand to reduce all of the oxides of manganese to the metal.

A green slag is evidence of lack of sufficient carbon to carry out the reduction of the manganese oxide. The depth of color is an indication of the amount of manganese present. When there is an excess of silica present slags are sometimes pink, due to the presence of manganese silicate.

An excess of reducing agent tends to the formation of calcium carbide and graphite accretions in the furnace. This may in some cases be carried so far as to leave an excess of silica and promote the formation of manganese silicates in the slag; in any event, there is a waste of power and the accretions interfere with operations, rendering it necessary to shut down and dig out the furnace at frequent intervals. The best slags seem to have a composition of about 30 per cent silica, 15 per cent alumina and 50 per cent lime plus magnesia, or better, should have an oxygen ratio, alumina being counted as base, of between 1.25 and 1.50. A slag of this composition is easily fusible, separates well from the metal and is economical to make.

Volatilization Losses

Under volatilization in the balance sheet has been included losses by dusting. In the electric furnace losses by dusting should not be large. Some loss by dusting is caused by occasional blows and boils occurring during periods of irregular operation. That the greater part of the manganese lost except for that contained in the slag is volatilized in some manner is very evident. In just what form or forms the manganese is volatilized I do not know, nor have I ever seen a satisfactory explanation of the phenomenon. It is usually considered that the manganese is volatilized as the metal, which, escaping from the furnace, burns at the surface of the charge to the oxide. The presence of brownish fumes in the gases escaping from the furnace would readily lead one to this conclusion. On the other hand, I have observed furnaces running with a comparatively cool top when there was no evidence of these brownish fumes, but which were still volatilizing a considerable amount of manganese.

In the case of a furnace volatilizing considerable amounts of manganese, I have observed that considerable amounts of iron, in fact based on the relative proportions of iron and manganese in the charge, more iron than manganese is volatilized. An attempt to reduce the manganese content of the slag by using more carbon is accompanied in most instances by an increased volatilization loss. In order that we may learn how to minimize our volatilization losses, it is important that we should know in what manner manganese is volatilized.

Excessive volatilization will occur inevitably in a furnace improperly designed as regards heat distribution. A furnace must be properly proportioned with reference to the power input in order to operate efficiently. Given such a furnace, however, we often find that the volatilization losses vary widely from time to time. The theory has been advanced that manganese and iron are volatilized as carbonyls, which in the hot-top furnace burn to the oxides of the respective metals and carbon dioxide and in the case of furnaces operating with a cooler top may pass off as gases unnoticed. This fits in very nicely with my observations with reference to addition of carbon, and its effect on increased volatilization. The formation of carbonyls, if such exist, may be due to the formation of carbides of iron and manganese, which in turn react with the metallic oxides present, reducing them and at the same time setting free carbonyls.

As in many cases, the slags produced by the electric manganese furnace have a distinct fluxing value. It might be well to throw more manganese into slag by cutting the carbon on the charge, provided the combined loss in manganese is not increased thereby.

Calculation of Charge

The charge will be calculated on the following basis:

We shall assume that the metal is to contain 70 per cent manganese, 5 per cent carbon, 5 per cent silicon and 20 per cent iron.

A charge will be calculated on the basis of 100 lb. of ore.

In proportioning the amount of reducing agent required, we shall assume that the fixed carbon only is available for bringing about the reduction of the several metals. As has been pointed out, this is not a correct assumption, as some reduction is very evidently effected by the carbon monoxide gases and possibly the volatile hydrocarbons. It gives us, however, a starting point, and in the absence of complete data as to the reducing power of the fuel used, enables us to calculate the charge.

The magnesia will be calculated to $2MgO.SiO_2$, alumina to $Al_2O_3.3CaO.2SiO_2$ and the balance of the silica to $2CaO.SiO_2$.

Sufficient iron will be added to give 70 per cent metal containing 20 per cent iron, assuming 80 per cent of the manganese to enter the metal.

Carbon Requirement

C to reduce MnO_2 to Mn $\dfrac{23.92 \times 24}{87} = 6.60$

C to reduce MnO to Mn $\dfrac{26.37 \times 12}{71} = 4.46$

C to reduce FeO to Fe $\dfrac{1.14 \times 12}{72} = 0.19$

C to reduce Fe_2O_3 to Fe $\dfrac{1.40 \times 36}{160} = 0.31$

C to reduce SiO_2 to Si $\dfrac{4.34 \times 24}{60} = 1.73$

C to supply metal $= 2.02$

15.31

We shall, therefore, require $\dfrac{15.31}{0.5443} = 28.1$ units of coal per 100 units of ore.

In the ore and coal we shall have to flux, after allowing for the 4.34 units of silica which is reduced and which enters the metal,

9.82 units SiO_2
2.15 units Al_2O_3
1.24 units MgO
0.03 units BaO

Now figuring MgO to $2MgO.SiO_2$ we get

$$\frac{1.24 \times 140}{80} = 2.17 \ 2MgO.SiO_2.$$

Al_2O_3 to $Al_2O_3.3CaO.2SiO_2$.

$$\frac{2.15 \times 388}{102} = 8.18 \ Al_2O_3.3CaO.2SiO_2.$$

6.31 units of SiO_2 remains to be fluxed. Calculating to $2CaO.SiO_2$ we have

$$\frac{6.31 \times 172}{60} = 18.1\ 2CaO.SiO_2.$$

Total lime required = 15.24 units, or marble on charge would be

$$\frac{15.24}{0.55} = 27.7 \text{ lb. per } 100 \text{ lb. ore.}$$

We have in slag

		Theoretical Analysis Per Cent
9.82 units	SiO_2	34.4
21.5 units	Al_2O_3	7.6
1.24 units	MgO	4.4
0.03 units	BaO	0.1
15.24 units	CaO	53.5
28.48		100.0

Assuming 80 per cent recovery of manganese, the iron required would be 6 lb. per 100 lb. ore.

Our charge, based on 500 lb. of ore, would then stand

Ore	500 lb. (227 kg.)
Coal	140 lb. (64 kg.)
Lime-rock	140 lb. (64 kg.)
Turnings	30 lb. (14 kg.)

If no special attempt is made to keep the silicon down to 5 per cent the lime can be cut to a considerable extent, depending upon the amount of silicon permissible in the metal. If low silicon metal is desired the coal may be cut, leaving the lime-rock as above. The coal may in any event be reduced somewhat, as has been pointed out previously, but this should be done a little at a time, and the furnace watched carefully. At least 24 hr. should be allowed to elapse between such changes. The calculation of the charge can at best only serve as a guide. Much depends upon the characteristics of the furnace that is being operated. The operator must watch his furnace and vary the charge from time to time to suit operating conditions.

Industrial Cost Association

At the meeting of the Industrial Cost Association in New York, Sept. 27, the following four directors were elected: W. E. Hundley, auditor Mesta Machine Co., West Homestead, Pa.; W. H. Moore, secretary Gulf States Steel Co., Birmingham, Ala.; G. K. Wilson, assistant secretary Sullivan Machinery Co., Chicago; Spencer M. Duty, president Medal Paving Brick Co., Cleveland.

The organization is new, its objects being: To encourage the interest of manufacturers in accurately determined costs; to standardize accounting and cost terminology; to develop the use of charts and other forms of statistics that graphically portray cost data; to assist standardization committees of trade associations; to provide general meetings for interchange of ideas; to act as a clearing house in distributing the development in cost practices.

Membership is limited to executives of industrial corporations, firms and trade associations; these executives who use cost data, or encourage others in its use; and those who control or are permanently and actively engaged in the executive supervision of cost accounting of corporations, firms or trade associations.

Officers are: President, M. F. Simmons, General Electric Co., Schenectady, N. Y.; first vice-president, C. H. Smith, Westinghouse Air Brake Co., Wilmerding, Pa.; second vice-president, Roland H. Zinn, Tanners' Council, New York; secretary-treasurer, A. A. Alles, Jr. Executive offices of the association are in the Peoples Bank Building, Pittsburgh. There are 20 steel plants and metal-working establishments represented in the membership.

Butler Day at Niles, Ohio

In honor of Joseph G. Butler, Jr., veteran iron and steel manufacturer of the Mahoning Valley, Oct. 23 has been designated as "Butler Day" by the city of Niles and an appropriate program will be carried out. Business houses will suspend and schools will close during the celebration. Mr. Butler was instrumental in building the McKinley Memorial Building at Niles, the most imposing edifice in the Valley, and it is in appreciation of this and numerous other efforts in behalf of the community that the event is being arranged.

PRICE FIXING

Anxiety Caused by Action of Indiana Commission in Regard to Coal Rates

WASHINGTON, Oct. 12.—Officers of the National Coal Association are greatly concerned over what appears to be an entering wedge on the part of the States toward a system of peace-time price fixing. The action in question is the establishment by the State of Indiana of a special coal and food commission. Members of this commission were recently appointed by the Governor of Indiana following the enactment of legislation by the State Legislature during the summer. The commission will have supervision over the coal industry engaged in intrastate commerce in Indiana.

An injunction suit was filed in August by which it was sought to test the power of the State of Indiana to regulate its coal industry in the manner contemplated by the Legislature. The application for this injunction was dismissed on the ground that "though portions of the act might be in violation of constitutional rights, relief could not be granted until the commission had entered an actual order, the effect of the enforcement of which would be to impair contracts or otherwise to deprive one of rights and privileges guaranteed by the constitution."

The coal operators intend to carry the case to the Supreme Court of the United States in order that price fixing of the character proposed may not gain a foothold.

Rush C. Butler, general counsel of the National Coal Association, comments upon the situation in the latest issue of the official publication of the organization.

"The interesting and at the same time alarming feature of the opinion of the court is that while no state in the United States has heretofore attempted any such regulation of a concededly private industry, it is apparent that the exercise of price fixing and other regulatory powers by the Federal Government during the war has made such an impression as to lead the court seriously to consider whether the exercise of those powers by the several sovereign states during times of peace may be nothing more than the exercise of the portion of the police power not delegated by the states to the Federal Government," says Mr. Butler.

"Perhaps I should not have used the word 'alarming' in speaking of this opinion, for after all the laws which govern us, whether municipal, State or Federal, rarely reflect the mind and will of the people, and the court's duty is merely to interpret and apply these laws.

"Accordingly, if it is the will of the people that such laws be enacted, it is clearly within their power by constitutional amendments if not otherwise to authorize the enactment of statutes similar to the one referred to. However, the opinion of the court may well give alarm to the coal industry if for no other reason than that that industry and no other is singled out for price fixing and regulation in this particular piece of legislation."

Phoenix Tube Co. Expansion

Preparations are being made by the Phoenix Tube Co. of Warren, Ohio, to increase the size of its plant threefold. The concern manufactures tubing for metal beds, bicycle frames and the like, and supplies more than half of the tubing for the metal bed trade of the country. Branch offices are to be established shortly in Chicago. Much of its product will be taken by the Warren Metallic Bed Co., which is about to erect a works in Warren adjacent to the Phoenix Tube company's property.

On a complaint filed by the Moreland Motor Truck Co., Los Angeles, Cal., the Interstate Commerce Commission has decided that the complainant is not entitled to a rebate on its carload and nine less-than-carload lots of cast steel vehicle wheels from Syracuse, N. Y., to Los Angeles, Cal., on which it claimed the charges to be unreasonable because they exceeded the rates on wooden motor truck wheels.

Production at Youngstown 80 Per Cent

President Campbell Reports New Business About 50 Per Cent of Shipments—Interesting Developments in the Labor Situation

YOUNGSTOWN, Ohio, Oct. 11.—President James A. Campbell of the Youngstown Sheet & Tube Co. states that current new business is at the rate of from 50 to 60 per cent of shipments, which is considered very satisfactory in view of generally reported decline in buying. Prospects of heavy railroad purchases strengthen the optimism which district makers continue to manifest. Production costs last month were the highest in the history of the industry, states Mr. Campbell, rendering somewhat improbable sharp break in prices all along the line at this time.

Production throughout the district is being maintained on an 80 per cent average. Carnegie Steel Co. plants continue to be hampered by fuel shortage and are operating at 70 per cent. Two 10-in. bar mills at the Brown-Bonnell works of the Republic Iron & Steel Co. have resumed after a brief suspension. Unshipped tonnage is now nearing normal and the heavier shipments of the past two months have improved both the physical and financial condition of producers. The heavy backlog represented a large cash value which the makers were unable to realize as long as the steel remained in their yards. Financial institutions, however, had made every provision for such a contingency and were prepared to advance funds to the companies to insure continuity of employment.

Sustained Demand for Sheets

There is sustained demand for sheets, pipe and wire products. With the railroads as factors in the market, there should be active competition for shapes, plates and bars. There has been limited revival in plate demand, a number of inquiries for 500-ton and 1000-ton lots being reported. The independent price continues firm at 3.25c., which makers say they will be unable to materially shade with semi-finished material at present prices. In the Valley, most of the sheet bar tonnage has moved around $70, but one sheet maker has closed for his requirements at an average price slightly below $65.

Expedited pipe shipments have also resulted in a more active inquiry for tank plates for the oil territory, as pipe consuming interests have been enabled to speed operations. Because of limited casing, supply drillers were compelled to curtail operations and production also suffered. Jobbers have appeared before pipe makers emphasizing their needs for standard pipe.

In the sheet market the only apparent weakness appears to be with the smaller interests which have been engaged chiefly in premium production for prompt delivery. These mills now report a more active inquiry, but it is evident that prices will be more or less responsive to demand within a limited sphere for some time to come. With some of the larger independents, the ruling minimum for black sheets is still 7c. base, while certain interests are naming 6.75c., and others quote above 7c. for delivery within thirty days. Heavier gages of blue annealed are weak, but there has been some betterment in the lighter gages. Galvanized demand is sustained at an average price of 8.50c., although the spread is quotable on this grade from 8.25c. to 9c.

One large independent with a heavy sheet capacity reports that its cancellations in September were less than 250 tons. Only a small percentage of its business, however, is with the automobile industry. A noticeable feature of the market is the unrestricted demand on the part of the maker of a well-known low-priced car, who is endeavoring, however, to place business at lower levels, to conform to price reductions of the finished article.

The district's principal strip steel producer is unable to name better than sixty days' delivery on cold-rolled material and six weeks on hot-rolled. The former grade is quotable among the independents around 8.50c. and the latter 5.50c.

Improvement in Labor

There has been a substantial improvement in the labor situation and disturbing factors have largely disappeared. This is declared by executives to be attributable in part to the growing unemployment in all branches of industry, and to the desire of employees for steadier work following more or less intermittency during the past year. While labor efficiency has by no means attained pre-war standards, nevertheless there has been an appreciable response to changed conditions on the part of workers. Agitation has been reduced to negligible proportions and the professional agitator will meet with little open encouragement. There appears not only to be a better spirit among employees in the industry, evidencing itself in strengthened morale, but a sincere desire to avoid labor complications.

Manufacturers, on the other hand, have endeavored in every way to maintain employment as regularly as possible. Many instances could be recorded where men have been kept at work when a temporary suspension would have been desirable from the financial standpoint. This policy Valley makers have made it plain they will continue as long as possible, and it is expected there will be a minimum of labor trouble during the winter. There appear to be evidences, though, that manufacturing concerns are preparing to fortify themselves against labor disorganizations in event of a general wage reduction in the industry. No cut appears likely, however, for an indefinite period.

Attitude of the Amalgamated

Conflicting reports have been received about the methods being used by the Amalgamated Association of Iron, Steel and Tin Workers, through various local groups, to organize the plant of the Newton Steel Co., at Newton Falls. It is certain manufacturers are not inclined to countenance intimidation of any sort and there is an undercurrent that one or two independent concerns may fail to renew their annual agreement with the Amalgamated Association and will operate their plants on an open-shop basis, in case of serious disagreement with the men.

On the whole, the outlook for Valley steel plants is better than it was two weeks ago and any slack in demand has failed to substantially affect quotations or curtail operating schedules.

Youngstown Company Moving

Offices and machinery of the Youngstown Pressed Steel Co. are being moved from the company's old property at Haselton in Youngstown to a modern plant at Warren, Ohio. Officials are now located in their new quarters. The company is closely allied with the Sharon Steel Hoop Co., having been formed to take over the pressed steel department of the old Youngstown Iron & Steel Co., when it was absorbed by the Sharon concern. Its buildings at Haselton will be utilized by the Sharon Steel Hoop Co. Its Warren plant was erected to afford employees an abundance of natural light.

Blaw-Knox Life, house organ of Blaw-Knox Co., Pittsburgh, for October, contains an interesting article on sheet and tin mill practice, which, although primarily written about the company's equipment for such mills, contains much that is informative to the layman.

The Farrell, Pa., works of the Carnegie Steel Co., in September, established a new accident-prevention record, having only four minor mishaps in that period.

Bench Drilling Stand

The bench drilling stand shown in use in the accompanying illustration is being marketed by the Black & Decker Mfg. Co., Baltimore, to take its ⅜, ½, 9/16, ⅝ and ⅞-in. portable electric drills. The bracket carrying the drill can be raised or lowered on the vertical column and is secured in any desired position by a split collar and clamping screw. The drill may be swung clear of the base, making it possible to use the stand for such work as applying ring gears to automobile axles, drilling in the ends of shafts, and other work too high to be

Drilling Stand for Black & Decker Portable Electric Drills. The drill can be swung clear of the stand to provide for work too high to be drilled on the bench

drilled on the bench. Both vertical and horizontal adjustments are secured by means of the clamping screw.

The long feed lever gives a feed ratio of 6 to 1, and 100 lb. pressure applied to the handle, it is stated, feeds the drill under 600 lb. pressure. The base has six tapped holes to accommodate ½-in. studs, used to clamp work in place. The base is provided with four holes for fastening the stand to the bench. The drill can be readily detached from the stand.

The over-all length is 30 in.; vertical adjustment of drill, 12 in.; drilling radius, 7 in.; feed, 4 in., and net weight, 70 lb.

Western Malleables Co. Activity

The Western Malleables Co., Beaver Dam, Wis., which on Sept. 1 resumed a full operating schedule after working five days a week for more than three months, will start the second furnace at the new Center Street plant on Oct. 15 and is advertising for additional labor. According to H. L. Kirsh, general manager, the force is short 150 men and enough orders are on the books to keep the entire plant operating at maximum capacity until Jan. 1 without any new work being accepted.

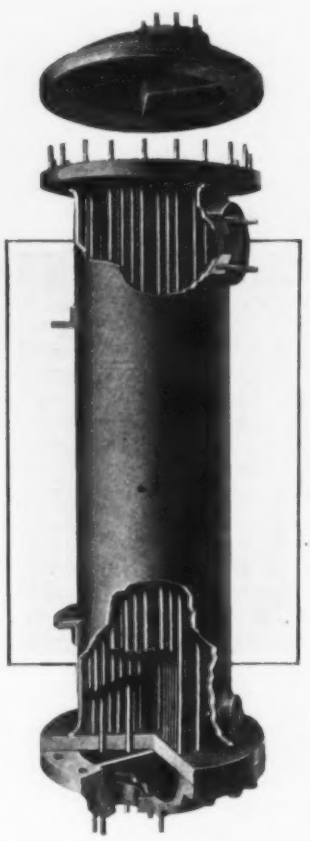
An asbestos insulated magnet wire marketed under the name Salamander, and for which high dielectric qualities are claimed, has been patented by the Independent Lamp & Wire Co., 1737 Broadway, New York.

Plenty of Ore in the Mahoning Valley

Mahoning Valley furnace interests believe that ore requirements during the winter will be fully met because of the heavy stocks at the lake docks. Due to shortage of open-top car equipment, ore has been dumped on the docks in much heavier quantities than the railroads have been able to cope with. The ore movement to the Valleys has not been up to its usual volume, but large consumers believe there can be a moderately heavy movement from the time navigation closes until weather conditions interfere seriously with transportation. Stock piles at the furnaces are not up to their usual proportions, in some cases, but managers are evincing no concern, aside from the fact that larger tonnages of frozen ore may have to be handled. To provide against such contingency, one district interest has added a specially heated building for thawing ore still in the cars and thus removing it with a minimum of labor and expense. Considerable difficulty is frequently encountered in unloading frozen ore and it is often necessary to dynamite it in the cars. This process is a costly one, frequently damaging the cars.

Oil Heater of Straight Tube Type

A new oil heater unit of the straight tube type is announced by the Griscom-Russell Co., 90 West Street, New York, manufacturer of the Reilly oil heater of the coil type.



Apparatus for Pre-Heating Fuel Oil Before It Goes to the Burner

The heater, as shown in the accompanying illustration, is for the preheating of fuel oil before it goes to the burner, thus to insure complete atomization of the oil and perfect combustion under boilers or in furnaces. The oil is pumped through the tubes, and high pressure steam in the shell serves as the heating medium. The shell is wrought steel welded to steel tube plates. The tubes are of seamless drawn steel expanded into the tube sheets at either end. The shell, tubes and heads allow for working pressures of 250 lb. per sq. in.

Where conditions require, retarders of twisted steel are fitted in the tubes. They extend the entire length of the tubes and are fastened at each end. Their purpose is to agitate the oil passing through the tubes and thus increase the oil velocity and heat transfer rate.

Work of installing the foundations for the 600-ton blast furnace being built for the Trumbull Steel Co. at Warren, Ohio, by the Trumbull-Cliffs Furnace Co. is being rushed in order that the concrete may be poured before cold weather. The company has awarded a number of contracts, including stoves, to the William B. Pollock Co., Youngstown, Ohio, and skip inclines, cast house and boiler house to the Lackawanna Bridge Co., New York and Buffalo.

The Bessemer Limestone & Cement Co. expects to start operation of one-third of the kiln capacity of its new cement plant at Bessemer, Pa., during the current month, and to have its entire capacity engaged in production by the first of the year. Buyers are placing contracts at current prices for next year's delivery.

Union Labor Power Waning in England

British Business Men in Washington Discuss Relations of Government to Their Plants and Make Severe Criticism

WASHINGTON, Oct. 12.—In an informal discussion of labor problems, British business men who are touring this country told a group of officers and directors of the Chamber of Commerce of the United States that the power of union labor in England is waning. Dissatisfaction was frankly expressed by the British delegates over the part played by their government in the settlement of labor disputes. It was declared that hope for the future lies in the absolute withdrawal of the British Government from participation in labor controversies.

A discussion of labor questions took place during the visit of the British delegates to Washington as guests of the Chamber of Commerce of the United States. The British business men had just come from a congress of chambers of commerce of the British Empire held at Toronto, Canada. The delegation was headed by A. J. Hobson, a Sheffield steel manufacturer, president of the Association of British Chambers of Commerce. Others in the delegation included Stanley Machin, president of the London Chamber of Commerce; W. F. Russell, vice-president of the Glasgow Chamber of Commerce; H. L. Symonds, deputy chairman and counsel of the London Chamber of Commerce; A. R. Atkey, member of Parliament, and representative of the Nottingham Chamber of Commerce, and Sir Thomas Mackenzie, late High Commissioner for New Zealand.

How Wage Awards Are Made

Mr. Hobson, in discussing labor conditions, criticized the manner in which governmental bodies had made wage awards.

"In December last year," said Mr. Hobson, "my men secured an extraordinary advance and were receiving more than 250 per cent of the previous wages, although the cost of living is supposed to have advanced only 150 per cent. They applied for a further advance on Christmas. It was referred to the Government tribunal handling disputes and we did not get a decision until April. I had to go on delivering my goods without knowing the cost, and in April my wages were put up 12½ per cent and that advance was dated back to Christmas. And I had been delivering goods for four months on an unknown rate of wages.

"In our business we have our men engaged on a monthly notice. I would recommend it as a valuable custom because the men know there can be no alteration of wages, either up or down, without a month's notice, and as the date approaches when the men are either going to be locked out or are going to go on strike, both sides have had time to cool and get reasonable.

"One of the results of the dating back of the advanced wages by the Government is that it has entirely broken up the custom of a month's notice, as the men will no longer recognize that they are under this obligation."

View of the Government

"The view of Government officials in England is that every man ought to be in a union and every employer in an association. The man who is not in an association or a union is a nuisance to a Government department. They like to see us arranged in regular regiments because, as they say, it is so much more convenient for a Government department to deal with us as one party than with each employer as an individual. The result is we are ceasing to be a free country, because the man who is not in the union is regarded, even by the Government of his country, as a man who is making an unreasonable use of his liberty in not joining the army he is supposed to be in and not being in the battle in which he ought to be.

"I think it is most deplorable that there is this insistence that every man must join the union. Many unions have restrictive clauses, such as that only sons of those in the trade shall come in the union, and other restrictive clauses directed toward an effort to form a monopoly in that trade, and if the scarcity of labor goes on long enough there is no doubt we shall be depleted of skilled men because of the apprenticeship rules under which that union is governed. That is one of the difficulties we shall have to face in England in the future."

Mr. Hobson was questioned by William Butterworth, president of Deere & Co., Moline, Ill., relative to the responsibility of labor.

"Collective bargaining is breaking down because of the irresponsibility of persons bargained with," said Mr Hobson in reply.

Causing Labor Troubles

Mr. Machin and Mr. Russell were especially severe upon the British Government for taking a hand in the settlement of labor disputes. Mr. Machin asserted that the Government had done more to cause labor troubles than any other element. In commenting upon wage problems, Mr. Machin said that profit-sharing had proved unsatisfactory because of dissatisfaction on the part of lower paid workmen with the larger returns of the higher class employees. He said that a system of bonus based on the output of various departments had proved most satisfactory.

Mr. Russell declared that the British Government must withdraw from participation in labor controversies.

"All trade disputes possible should be kept out of the hands of the Government," said Mr. Russell. "Lloyd George intimated in Parliament recently that at the earliest possible date the Government wanted to wash its hands of such matters. Hardly a head of any Government department but has acknowledged that as soon as possible Government control should be got rid of.

"In many ways, our Government has acted in a most unbusinesslike manner. In the railroad situation, the Government made concession after concession without adjusting revenues."

Mr. Symonds referred to the operation of the Whitley plan of labor councils.

The Whitley Plan

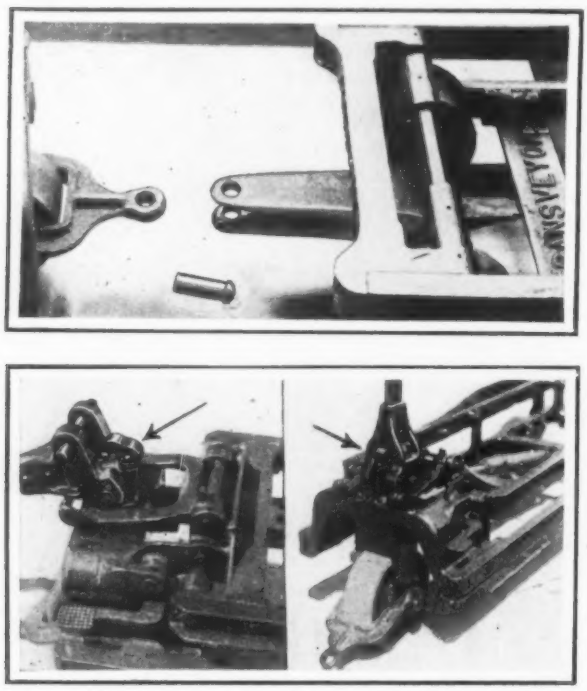
"I have been chairman of one of the councils set up under the Whitley scheme," said Mr. Symonds. "Good as it has been I think it has begun at the wrong end. I believe you should start by building up works councils and gradually bring them together in a larger body. I think that is the right way of proceeding."

Frederick J. Koster of San Francisco, in giving the American viewpoint of labor problems, said that he regarded it as a very hopeful thing that the power of labor unions in Great Britain was declared by the delegation "to be waning as a result of their tendency to put themselves above the law."

Allotment of 422 dwelling houses at Farrell, Pa., owned by the Carnegie Land Co., subsidiary of the Steel Corporation in charge of housing development, has been made to the Carnegie Steel Co. and the American Sheet & Tin Plate Co., in proportion to the number of employees. The houses will be disposed of to employees under the plan adopted by the Steel Corporation.

Industrial Truck With Trailer Attachment and Handle Latch

Improvements have been made in the type C transveyor manufactured by the Cowan Truck Co., Holyoke, Mass. An attachment which fits on the front wheel and hitches to the draw bar on the rear axle of the transveyor ahead of it, or the draw bar of the electric truck, permits the use of the transveyor as a trailer behind the electric truck either singly or in a train. This attachment involves no change in the construction



The Attachment Illustrated Above Permits the Use of the Transveyor as a Trailer. A safety handle latch holds the handle in an upright position

of the transveyor except a longer axle for the front wheel fork. The draw bar is applied to the rear axle of any transveyor without taking off the wheels, as it slips over the rear axle. The combination of the two parts is made to provide a connection as short as possible, so that the train will be no longer than necessary. The manufacturer explains that with this attachment the trucks track well and the turning radius is so short that a train of ten has been turned in a circle on a 20-ft. roadway. Up and down play is allowed, so that there will be no binding as the machines go over the door sills or the top of steep inclines.

A safety handle latch is now provided for holding the transveyor handle in an upright position to guard against premature dropping. The latch is made of tempered spring steel attached to the top of the king pin of the front wheel fork, and has two leaves. As the handle is thrown back into a vertical position it slips over the spring, and is held in that position. The latch, however, does not interfere with the free movement of the handle, when it is necessary to bring it down to manipulate the transveyor.

A New Non-Corrosive Alloy

The Midwest Engine Co., Indianapolis, has given the name Meco to a new metal alloy, discovered and perfected in its metallurgical laboratories and which resists corrosion by all acids except nitric and by most of the alkaline solutions. The metal, it is claimed, can be cast, rolled, welded or brazed without offering difficulties common to other acid-resisting metals. When burnished it is of nickel color and takes a high silver-like polish. The company expects that the alloy will be used largely on automobile bodies, and for mine pumps, marine pumps and other machinery exposed to the action of acids, alkalis and brine. A pump made of the alloy, it is reported, has been in use in a coal mine for five months without deterioration.

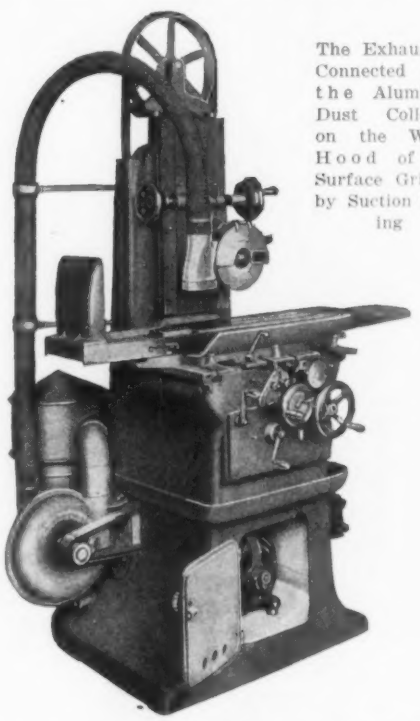
Machine Shop Addition of Nordberg Mfg. Co.

The Nordberg Mfg. Co., Milwaukee, designer and builder of steam and oil engines, mine hoists and air compressors, has just completed an extension of its main machine shop and bays. The 180 x 200-ft. addition will facilitate the erection of large engines and hoists, such as the 2000 b.hp. Diesel oil engine and several large hoists now on order. One of the latter, the Mitsue hoist in Japan, will be the largest hoist ever exported. The others are for the Arizona mining field. Prior to the erection of the new addition, large castings after being machined were placed on the erecting floor. This handicapped the erectors by limiting the available space for erecting purposes. Under the new arrangement the machined castings will be placed in the new addition until wanted on the erecting floor. A new addition to the office building is also being completed. It will provide large private offices and more space for the drafting room.

Exhauster Attachment Surface Grinder

Modern requirements for the safety and health of the employee demand an efficient device for disposing of the dust generated by grinding machines, especially surface grinders, when operating without the use of water, which is frequently necessary. Where these machines are not placed in groups to be served from one central exhaust system, it is desirable to have the individual machine equipped with its own unit, and in many cases it is really more economical to have each machine of a group individually equipped, as the exhauster is then running only while the machine is in operation. This is especially true where the individual motor drive prevails.

Realizing the importance of collecting as much of



The Exhaust Is Connected with the Aluminum Dust Collector on the Wheel Hood of the Surface Grinder by Suction Tubing

this dust as practicable, the Abrasive Machine Tool Co., East Providence, R. I., decided to design a complete new system for its machines, as is shown in the accompanying illustration. The exhauster is a machine-tool-built product, equipped with S-K-F ball bearings, and aluminum fan, running at 4000 r.p.m. The exhauster is connected with the aluminum dust collector on the wheel hood by means of flexible wire-insert rubber suction tubing. The wheel dust is drawn in through the flexible tubing, and forced into the centrifugal drum attached to the rear of the machine, where the dust is separated and deposited at the bottom of the cone. The free air passes out through a circuitous route, and, it is stated, is practically dustless. The accumulation of dust can be removed by unscrewing a cap at the bottom of the separator drum.

Price Guaranteeing Is Declared Abominable

Sheet and Tin Plate Manufacturers Take Decided Stand Before Federal Trade Commission Against Old Time Practice—Cause of Speculation and Cancellations

WASHINGTON, Oct. 12.—Opposition to a guarantee by manufacturers against price declines was expressed by George D. McIlvain, of Pittsburgh, secretary of the Association of Tin Plate Manufacturers, and Thomas D. McCloskey, of Pittsburgh, counsel for the National Association of Sheet and Tin Plate Manufacturers, before the Federal Trade Commission last week. They were among 100 representatives of all kinds of industries who responded to the invitation of the commission to participate in a trade practice submittal for the discussion of the question as to whether price decline guarantees constitute an unfair trade practice.

Mr. McIlvain acted as chairman of one of three groups into which the conference was divided. He introduced speakers who were opposed to any form of price guarantee, Mr. McCloskey being one of the members of his group. Of the other two groups, one was made up of those who believed the practice to be proper and urged the commission to keep its hands off, while the third group included those favoring it with qualifications.

Some Favor Guarantee

As a general proposition the conference developed that wholesalers of various kinds favor the guarantee inasmuch as they benefit from it, but that retailers are against it, having failed to benefit by any guarantee made by the manufacturer to the wholesaler. So far as the manufacturers are concerned, most of them seem to be inclined to oppose it, although a few in certain lines believe it to be to their advantage and are anxious to continue its use. No action was taken by the conference. The information presented was for the guidance of the commission in making up its mind as to whether the price decline guarantee constitutes an unfair trade practice.

Mr. McIlvain explained that he spoke for independent manufacturers of tin plate, while Mr. McCloskey represented more largely independent manufacturers of sheets. They said that the practice of guaranteeing against price decline had been driven out of the industry six or seven years ago and that they were anxious that it should not be allowed to gain a foothold again.

Mr. McCloskey presented resolutions not only for the National Association of Sheet and Tin Plate Manufacturers but from a group of other organizations which included the Pressed Metal Association, the Wheelbarrow Association, the Drop Forge Association, and the Barrel Manufacturers' Association.

Declared Fundamentally Wrong

"The National Association of Sheet and Tin Plate Manufacturers is composed of from 90 to 95 per cent of the independent sheet and tin plate manufacturers," said Mr. McCloskey. "It does not include the Steel Corporation. These manufacturers have been trying for some years to do away with the abominable practice which prior to six or seven years ago was extant in the industry. This guaranteeing of prices against decline is fundamentally wrong. We believe that it is nothing more nor less than a form of rebating.

"We know by experience in our industry that it does create speculative buying. We have known jobbers and wholesalers to buy their capacity three and four times over and speculate with the manufacturers' money. We don't think it increases the amount of sheet and tin plate purchases one iota. We believe it creates an artificial level of prices.

"I have been informed that one of the automobile manufacturers has guaranteed the price until next summer. That can have but one result, and that is to keep the price where it is. It is not beneficial to the public. Wherever the price is guaranteed the manufacturers are going to see that it does not decline. There is mighty little repayment.

Fictitious Contracts

"The guarantee against price decline resulted in what we find to-day, a very serious demand for postponing and cancellations. It puts fictitious contracts on the books of the manufacturers.

"It tends toward a monopoly. It drives the little fellow out of business. We are firmly convinced that there ought to be no agreement with respect to maintaining prices."

Commissioner Thompson questioned Mr. McCloskey as to whether the practice was now prevalent in the industry.

"Not now," said Mr. McCloskey. "It was six or seven years ago, but we drove it out. It would put us in a horrible position if it came back."

"Do any of the big fellows guarantee prices?" asked Mr. Thompson.

"I think not," said Mr. McCloskey, in reply.

Among those favoring the price guarantee with qualifications was L. F. Boffey, New York, representing the National Association of Purchasing Agents.

"We hold that the practice of a manufacturer guaranteeing a price on goods, title to which has not passed, is sound economically," said Mr. Boffey. "If the price guarantee is not allowed buyers will hold off from long term commitments. We believe that a price guarantee is eminently fair. We would not favor it, however, beyond the actual delivery of the goods to the purchaser."

Privately Owned Fleets Increasing

WASHINGTON, Oct. 11.—Privately owned merchant fleets in the United States are now increasing more rapidly than the vessels of the United States Shipping Board, according to the returns of the Bureau of Navigation. During September the fleet of seagoing ships of 500 gross tons or over of private American shipowners rose to 1829, of 4,625,324 gross tons, an increase during the month of 25 ships of 116,335 gross tons, while the Government-owned tonnage during the month increased only 20 ships of 88,855 gross tons, giving a Shipping Board total of 1698 ships of 7,288,208 gross tons on Oct. 1.

During September 135 vessels of 261,962 gross tons, built in American shipyards, were officially numbered by the Bureau of Navigation against 178 vessels of 259,210 tons in August, and 173 vessels of 217,239 tons in July. For the twelve months ending with September the total was 1959 ships, aggregating 3,241,328 tons.

Warren Metallic Bed Co.'s New Plant

Work will start this fall on the first unit, 90 x 440 ft., of a new plant to be erected at Warren, Ohio, by the Warren Metallic Bed Co., which will purchase the effects and business of the Greater New York Bed Co., Brooklyn, N. Y. Through negotiation with the Warren Board of Trade, the company has acquired a five-acre site adjacent to the plant of the Phoenix Tube Co. The company will be incorporated in Ohio with a capital of $300,000, and will spend $150,000 on the initial unit and equipment. A packing warehouse, paint shop and other outshops are to be constructed. The company assigned as its reason for moving its desire to be near the raw material market, as most of its tubes will come from the Phoenix Tube Co.

More Open Top Cars for Shipment of Coal

Interstate Commerce Commission Takes Further Action to Increase Supply of Fuel for Domestic Users—Will Provide for Moving 21 Cars Daily

WASHINGTON, Oct. 12.—By a tightening up of restrictions on the use of open top cars, the steel industry will be further hampered in the transportation of its products. The Interstate Commerce Commission has issued Service Orders Nos. 20 and 21, which aim to make available for coal use additional open top cars. The latest orders are designed to provide for the movement of domestic sizes of bituminous coal during the weeks remaining before the close of navigation on the Great Lakes, while efforts are being continued to insure an adequate supply of all kinds of coal for the Northwest.

In order to provide for the movement of 2100 cars daily for supplying domestic users of coal in Ohio, Indiana, Michigan, eastern Kentucky, eastern Tennessee, western Pennsylvania and West Virginia, new restrictions are imposed on the use of open top cars.

The new order extends to a number of States west of the Mississippi River the order requiring railroads to reserve for coal use open top cars having sides 38 inches or more in height. The original order applied only to railroads east of the Mississippi River. The new order applies to railroads as far west as the eastern boundary of the States of Montana, Wyoming, Colorado and New Mexico. This order, which is Service Order No. 20, is effective Oct. 15.

Coal for Public Utilities

Service Order No. 21 affects the movement of coal for public utilities, which include gas, ice, electric, and water works. Previously a blanket preferential order has been in effect, insuring the movement of coal to public utilities. The public utilities are believed to have accumulated sufficient stocks to make it possible to do away with the blanket priority. Hereafter special permits will be issued for movement of coal to them when needed. Only public utility plants in greatest immediate need will receive permits for preferential car supply. No coal will be diverted to them for the present for storage purposes.

All outstanding permits for the use of coal cars for transporting other freight have been canceled, effective at midnight Oct. 10. Permits of this character will now be issued only "upon a showing of public interest."

The new orders supersede Service Orders Nos. 15 and 16. They are effective until further notice. It is the expectation that they will be kept in effect until about Dec. 1, when the lake navigation season closes. After the needs of the Northwest are met through the movement of coal by the lakes, it seems to be the general belief that there will be sufficient coal for other purposes during the winter.

Heavy Increase of Production

In a statement explaining the purpose of the two orders the Interstate Commerce Commission says that the result of the previous orders has been a heavy production of bituminous coal, exceeding the production for the summer months of 1917 and 1919, and, despite various labor disturbances, approximating the average for the three years of 1917, 1918, and 1919. Production of coal during August, 1920, it is pointed out, has never heretofore been exceeded except during August, 1918, when an intensive campaign as part of the war program was under way. The amount of coal made available for American industry since the first of the service orders of the commission, it is stated, has been substantially equal to or above the average for recent years, notwithstanding the strikes of miners and switchmen and the recent car congestion.

"The increased production has been consumed in a large part by industries, by railroads and other public utilities, by the Northwest and by New England, and by exportation," says the commission. "There has not been a sufficient production of the sizes of coal for domestic purposes to satisfy the present demands for such uses. Vigorous complaints have been received in behalf of the domestic users of coal in Indiana, Ohio and Michigan. Complaints have also been received from Oklahoma, Texas and other western states. It is imperative that the production of coal be even further increased. To accomplish this it will be necessary to increase the car supply for coal."

The commission states that under the permit system in effect since June 21, the date of the issuance of the open top car order, numerous permits have been issued authorizing the use of coal cars for the transportation of other freight of emergency character.

"By an order effective June 21, 1920, railroads east of the Mississippi River were required to furnish coal cars to coal mines in preference to any other use," says the commission. "Because of the abnormal demand for coal cars to transport iron and steel, road building and other building material, by a definition of what constituted a coal car, approximately 80,000 flat bottom gondola cars were subsequently excluded from the effect of that order. In addition numerous additional permits have been issued from time to time authorizing the use of coal cars for the transportation of other freight of an emergency character. The demand for coal cars for other freight has been accentuated by the very large building program which is under way."

Production of Coal and Coke

Production of bituminous coal fell off sharply during the week ended Oct. 2, according to the report of the Geological Survey. The total output was estimated at 11,348,000 net tons, a decrease when compared with the preceding week of 506,000 net tons, or 4.3 per cent. The production of the previous week was the highest of any week of the year. Anthracite production was back on a normal basis, the production amounting to 1,804,000 tons, which was almost equal to the output of the last full week before the strike.

The output of beehive coke decreased 22,000 tons during the week ended Oct. 2. Preliminary estimates place the total production for the week at 380,000 net tons, as against 402,000 tons during the preceding week. The cumulative production of beehive coke from Jan. 1, 1920, to date has amounted to 16,075,000 tons, an increase of 1,278,000 tons over 1919.

Electric Furnace Association

The fall meeting of the Electric Furnace Association was held in connection with the Foundrymen's convention at Columbus, Ohio. The subject for discussion was "Refractories for Electric Furnaces." Sessions were held on Wednesday afternoon at Ohio State University, and papers were read by Raymond H. Howe, fellow at Mellon Institute for Refractories Manufacturers Association; Dr. M. L. Hartman, Carborundum Co., Niagara Falls, N. Y.; R. T. Stull, superintendent of the ceramics experimental station of the United States Bureau of Mines at Ohio State University; H. F. Staley, of the United States Bureau of Standards; C. W. Berry, ceramist of the LaClede Christy Clay Products Co.; A. F. Greaves-Walker, American Refractories Co., and the laboratory superintendent of the Foote Mineral Co.

Five More Members of Engineering Federation

Five additional members are announced of the Federated American Engineering Societies: Engineering Association of Nashville, which voted to become a charter member on June 7. American Institute of Chemical Engineers, voting June 29. Engineering Society of Buffalo, voting Sept. 21. American Institute of Mining and Metallurgical Engineers, voting Sept. 24. Society of Industrial Engineers.

British Researches in Non-Ferrous Alloys

Corrosion of Condenser Tubes Among Topics of Autumn Meeting of Institute of Metals—Manganese Bronze and Other Alloys

(*Special Correspondence*)

[The following supplements the report in THE IRON AGE of Sept. 30 of the autumn meeting of the Institute of Metals held at Barrow-in-Furness. Lack of space made it necessary to carry over to this issue the subjoined reviews of papers and discussions. What was given in the first sections included contributions on the question of gases in high-grade brass and on gun metal.]

Crystal Growth and Recrystallization in Metals

This paper by Prof. H. C. H. Carpenter and Miss Constance F. Elam deals with the growth of crystals in an alloy of tin and antimony containing 1.5 per cent of the latter metal, which is well adapted for studying this phenomenon. A particularly lucid and well-illustrated record of the authors' work, together with a notice of previous work on the subject, and a discussion of current theories, is followed by a number of interesting conclusions. It may be noted that no existing theory of crystal growth explains the new facts put forward. The authors consider that they are justified in the following conclusions:

Neither crystal growth nor recrystallization will take place unless the metal has been subjected to plastic deformation (in the absence of a change of phase).

Neither crystal growth nor recrystallization will take place after plastic deformation unless the metal is heated to a certain minimum temperature and for a certain minimum time.

The effects of work may be divided into three categories, according to the amount of deformation: (1) The production of twins or slip-bands, or both, followed neither by growth nor recrystallization on heating. (2) The production of twins or slip-bands, or both, followed by crystal growth on heating. (3) The production of twins or slip-bands, or both followed by recrystallization and growth on heating.

The degree of deformation which will produce any of the effects enumerated above depends upon the temperature of heating. The higher the temperature the less the deformation required.

The effects produced by deformation are limited in extent and depend on the amount of deformation, the annealing temperature, and the period of heating. No evidence has been obtained in favor of the hypothesis that before equilibrium is reached growth should continue until the whole piece of metal consists of one single crystal. On the contrary, all the evidence obtained by the authors is against it, except under one particular set of conditions.

Recrystallization begins in the crystal boundaries of the old distorted crystals. It starts from a few points and gradually extends throughout the mass. Recrystallization is always followed by growth of the reoriented crystals into each other. Crystals can both grow and be grown into at one and the same time. A large crystal may grow at the expense of a small one, or a small crystal may grow at the expense of a large one. Neither similarity nor diversity of orientation affects the growth of one crystal into another.

The size of the crystals in a piece of metal that has reached equilibrium may vary within very wide limits. A large crystal does not necessarily invade a small crystal with which it is in contact. In the authors' experiments growth almost took place by "boundary migration" and not by coalescence.

DISCUSSION

Dr. W. Rosenhain thought that the authors had made rather a sweeping statement in saying that their results were incapable of being explained by any existing theory. In his view an application, with suitable modifications, of the amorphous film theory would give a fairly reasonable explanation. There was no doubt that the authors' facts could be reconciled with the amorphous theory, which was of great utility in explaining a large variety of other phenomena.

Prof. C. H. Desch said that it was essential to clear away a number of confusions and misconceptions, and although all the authors' conclusions could not be accepted the facts recorded were most valuable. It would seem, however, that we could not expect to get a complete theory working only on the coarse structure of the crystals by the examination of plane surfaces, and better means would have to be devised for studying the internal conditions of the crystals. He would not like to say that grain growth never took place in a cast metal, and thought it might be quite possible.

Dr. W. H. Hatfield thought most of the conclusions were additions to our knowledge of the subject, and were substantiated by the evidence adduced. He was not, however, satisfied that crystal growth or recrystallization would not take place unless the metal had been subjected to plastic deformation. It was common knowledge among those dealing with castings that the difference between slow and quick cooling casting conditions made the difference between large and small crystals, and it therefore seemed that there might be a range of temperature in which growth could take place in cast metal and it might be possible to obtain that range under experimental conditions. He agreed with the authors that no existing theory satisfactorily explained the phenomena.

Dr. F. C. Thompson referred to growth at the crystal boundaries and showed a number of micrographs illustrating additional distortion at the boundaries of the crystals after cold work. Another series, showing the relation of orientation to recrystallization, was some evidence contrary to the authors' statement that crystals of similar orientation did not grow into each other more readily than those of different orientation.

Miss Kathleen E. Bingham asked if the authors had tried the experiment of placing a polished specimen of their tin-antimony alloy in the furnace without etching and had found that etching marks resulted. She had obtained such results with zinc.

F. Johnson, referring to the invasion of large by small crystals, and *vice versa*, pointed out that what appeared to be a small crystal might be merely a cut-off portion of a large one.

Miss Elam, replying to the discussion, said the authors only claimed that up to the present there was no evidence of growth in castings without work, and pointed out that it was practically impossible to cut, polish and etch a specimen without introducing surface strain. In reply to Miss Bingham, they had tried the experiment and found that the crystals did show up in the furnace. In reply to Mr. Johnson, all they could say was that there was no evidence that the large crystals invariably grew at the expense of the smaller ones, or *vice versa*.

Professor Carpenter, dealing with Dr. Rosenhain's criticism regarding lack of explanation, said that this policy was deliberate. The conclusions arrived at were stated as definitely as possible, and were put forward for the consideration of their colleagues. This was the first stage in the reconstruction of our knowledge of a subject on which much misconception had arisen through loose theorizing.

Constitution of the Alloys of Aluminum and Magnesium

This paper, by D. Hanson and Marie L. V. Gayler of the National Physical Laboratory, describes the results of an investigation into the aluminum-magnesium series of alloys. The equilibrium diagram given by Grube, which previously has been the only one available, was incomplete. The work of the authors shows that it needs considerable revision, and they have now worked out the complete constitution over the whole system of alloys.

It is shown that aluminum and magnesium form two compounds with each other. One has the formula Al_3Mg_2 (37 per cent magnesium). It has a melting point of 450 deg. C. at which temperature there is a maximum on the liquidus curve. It forms a eutectic with aluminum, containing 33 per cent magnesium, the freezing point of which is 447 deg. C. Aluminum can

dissolve Al_2Mg_3 to give a solid solution containing up to 11 per cent magnesium at 420 deg. C. and 9 per cent at 150 deg. C.

The second compound probably has the composition Al_2Mg_3 (57 per cent Mg). It forms eutectics with both Al_2Mg_3 and magnesium. The Al_2Mg_3-Al_2Mg_3 eutectic contains about 41 per cent magnesium and melts at 446 deg. C. Al_2Mg_3 will dissolve Al_2Mg_3 and Mg. in appreciable quantities, and alloys containing from 47 to 60 per cent magnesium consist of homogeneous solid solutions. The eutectic of Al_2Mg_3 and magnesium contains about 70 per cent magnesium and melts at 436 deg. C. Al_2Mg_3 is soluble in magnesium. The saturated solution at 420 deg. C. contains about 10 per cent aluminum and at 150 deg. C. about 9 per cent aluminum. The solubility relationships of all the constituents in the solid alloys have been determined by annealing samples of the alloys for long periods, followed by quenching and examining them under the microscope. The solidus has also been determined in the same manner.

Professor Desch suggested a slight modification to the authors' diagram, and Dr. Rosenhain said it was enormously difficult to settle definitely the region in question.

Service Experience with Condensers

With the introduction of the water-tube boiler into the Navy condenser defects assumed an increasing degree of prominence, and although the proportionate number of failures is very small the results may be out of all proportion to the magnitude of the defect itself.

The paper by Engineer Lieutenant-Commander G. D. Allen, R. N., traces the growth of the prominence of such defects and gives examples of past causes of failure which have been eliminated by mechanical precautions. Present causes of failure are discussed with the object of showing that although the main problem is to provide immunity from corrosive action, marine condenser tubes are subject to other causes of failure, and must have properties other than resistance to corrosion. The paper comments on such experiences as have been gained with various protective treatments and processes and with alloys other than the admiralty mixture.

Discussion

Professor Carpenter, speaking as chairman of the Corrosion Research Committee of the Institute, said the committee had been attacked in a certain section of the press for its attitude toward the Cumberland process for preventing corrosion. He wished to point out that their attitude was completely justified by the author's statement that the admiralty had fitted the Cumberland system in certain vessels, but beyond the fact that it had been found that this process had not arrested decay where such decay had been in evidence before installation the experience gained had not been sufficient to allow of any reliable conclusions being drawn.

Dr. G. D. Bengough, investigator to the corrosion committee, said that his results were in general agreement with the author's, and then dealt with certain points of difference. As regards the condenser tube inlet ends, he had not found score-lines on microexamination which one would expect if the trouble were due to erosion, as the author supposed. He ascribed the trouble to bubbles producing what the committee had termed the water-line effect, and showed lantern slides illustrating a suggested mechanical modification to the fitting of the tube ends which would eliminate bubbles. As regards spills and laminations, they had done many experiments which had given negative results. These defects were not the initiating causes of corrosion, but were to be avoided as sources of weakness after corrosion started.

Note on a Failure of Manganese Bronze

J. H. S. Dickenson, of Wickers' Research Laboratory, Sheffield, as the result of examining a manganese bronze end plate from a turbo-alternator rotor which failed in service, found that certain fractured peripheral projections had been rendered brittle by the contact of fluid solder which had penetrated along the junctions of the crystalline grains.

The end plate was shown by analysis and microexamination to be a typical beta brass of simple polyhedral structure. Bend tests taken from the inner, unaffected portions showed toughness and ductility, whether tested at the room temperature or as high as 200 deg. C., but collapsed instantly under small loads, with an intergranular fracture and no appreciable distortion, if heated sufficiently to melt the point of a stick of soft solder applied to the side in tension. No such effect was obtained when solder was melted on the side in compression, or when a test piece was soldered on the tension side and stressed with the solder in the solid state. It was found that there had been local heating in the rotor and the solder appeared to have penetrated while the beta brass end plate was running under stress.

An investigation followed to elucidate the conditions under which alloys of the manganese bronze type, i.e. beta brasses, as well as alpha and mixed brasses, are prejudicially affected by contact with fluid solders, the special points on which information was required being to ascertain the stress required to produce failure, and also to what extent variation in composition and microsctructure affected the result.

The effect of bringing fusible alloys (melting at 69.5 deg. C., and 93 deg. C.), soft tin-lead solder, and tin into fluid contact with heated and stressed test bars of various kinds of brass has been ascertained. In all cases the result was greatly to reduce the maximum stress and cause intergranular fracture, this being by far the most marked in the case of beta brasses of simple polyhedral structure, less so when alpha and beta constituents occur together, and to nothing like the same extent in alpha brass with interlocking crystalline grains. These differences form a further example to show the danger of permitting metallic crystals to develop smooth and regular outlines. It is suggested that further work in this direction may throw additional light on the phenomenon of season cracking.

The author demonstrated the effect described with a small test specimen, and Dr. Rosenhain stated that there were many analogous cases of intercrystalline brittleness, which was evidently a widespread phenomenon. There would seem to be in crystal boundaries a substance which dissolved very readily.

Superior Ore Shipments in September

Iron ore shipments from the Lake Superior district in September show an increase of 9.11 per cent over the preceding September, or 8,923,482 gross tons compared with 8,178,483 gross tons. The total shipped in 1920 to Oct. 1 shows an increase of 17.2 per cent over a similar period a year ago, or 44,273,356 gross tons against 37,776,531 gross tons.

During the two Septembers, Duluth contributed 25.83 per cent of the total in 1920 and 31.69 per cent the year before; of the season's total Duluth is credited with

	September, 1920	September, 1919	To Oct. 1, 1920	To Oct. 1, 1919
Escanaba	1,088,806	939,101	5,483,644	3,696,996
Marquette	493,311	431,995	2,634,602	1,601,564
Ashland	1,253,633	1,190,086	6,187,035	4,510,178
Superior	2,330,512	2,033,804	11,291,936	8,453,318
Duluth	2,304,726	2,591,750	11,856,866	14,058,674
Two Harbors	1,452,494	991,749	7,019,273	5,455,803
Total	8,923,482	8,178,483	44,273,356	37,776,531

26.33 per cent this year, against 37.22 per cent last. Practically all other docks showed an increase this season over last.

The Daly Steel Products Corporation, metal stairways, announces the opening of its new 100 x 100 ft. plant at 90 to 100 Tenth Street, Long Island City, New York. Daniel A. Daly is president.

A tank 22 ft. in diameter and 30 ft. high was recently oxy-acetylene welded by the Welded Products Co., Birmingham, for the Liquid Carbonic Co. It was made of ¼-in. steel plates.

Statistics of Rolled Steel Products—Smaller Tonnages in 1919 Than in Preceding Year

In last week's issue of THE IRON AGE statistics, compiled by the American Iron and Steel Institute, showing production of steel ingots and castings and other products for a number of years, were published. Additional statistics are herewith published, some of the details being of special interest.

PRODUCTION OF IRON AND STEEL BLACK PLATES FOR TINNING 1896–1919.

Years.	Gross tons.	Years.	Gross tons.	Years.	Gross tons.
1896	185,387	1904	472,569	1912	982,197
1897	271,886	1905	507,587	1913	827,266
1898	345,254	1906	576,079	1914	938,181
1899	375,000	1907	504,072	1915	1,093,345
1900	315,000	1908	513,771	1916	1,283,802
1901	398,026	1909	606,482	1917	1,513,772
1902	365,743	1910	712,137	1918	1,502,690
1903	490,652	1911	795,598	1919	1,165,436

PRODUCTION OF BLACK PLATES FOR TINNING, SHOWING IRON AND STEEL SEPARATELY, GROSS TONS, 1904–1919.

Years.	Iron.	Steel.	Total.	Years.	Iron.	Steel.	Total.
1904	2,981	469,588	472,569	1912	5,378	976,819	982,197
1905	3,152	504,435	507,587	1913	2,779	824,487	827,266
1906	5,666	570,413	576,079	1914	2,272	935,909	938,181
1907	3,161	500,911	504,072	1915	2,038	1,091,307	1,093,345
1908	2,954	510,817	513,771	1916	1,878	1,281,924	1,283,802
1909	4,261	602,221	606,482	1917	655	1,513,117	1,513,772
1910	2,893	709,244	712,137	1918	.....	1,502,690	1,502,690
1911	3,515	792,083	795,598	1919	144	1,165,292	1,165,436

Similar statistics for earlier years are not available. In 1919 37 works made black plates for tinning, against 34 in 1918.

PRODUCTION OF WIRE RODS.

PRODUCTION OF WIRE RODS, GROSS TONS, 1888–1919

Years.	Tons.	Years.	Tons.	Years.	Tons.	Years.	Tons.
1888	279,769	1896	623,986	1904	1,699,028	1912	2,653,553
1889	363,851	1897	970,736	1905	1,808,688	1913	2,464,807
1890	457,099	1898	1,071,683	1906	1,871,614	1914	2,431,714
1891	536,607	1899	1,036,398	1907	2,017,583	1915	3,095,907
1892	627,829	1900	846,291	1908	1,816,949	1916	3,518,746
1893	537,272	1901	1,365,934	1909	2,335,685	1917	3,137,138
1894	673,402	1902	1,574,293	1910	2,241,830	1918	2,562,390
1895	791,130	1903	1,503,455	1911	2,450,453	1919	2,538,476

Small quantities of copper-clad steel wire rods are included.

PRODUCTION OF STRUCTURAL SHAPES.

PRODUCTION OF STRUCTURAL SHAPES, GROSS TONS, 1893–1919.

Years.	Tons.	Years.	Tons.	Years.	Tons.
1893	387,307	1902	1,300,326	1911	1,912,367
1894	360,305	1903	1,095,813	1912	2,846,487
1895	517,920	1904	949,146	1913	3,004,972
1896	495,571	1905	1,660,519	1914	2,031,124
1897	583,790	1906	2,118,772	1915	2,437,003
1898	702,197	1907	1,940,352	1916	3,029,964
1899	850,376	1908	1,083,181	1917	3,110,000
1900	815,161	1909	2,275,562	1918	2,849,969
1901	1,013,150	1910	2,266,890	1919	2,614,036

PRODUCTION OF HEAVY AND LIGHT STRUCTURAL SHAPES, GROSS TONS, 1912–1919.

Years.	Heavy shapes.	Light shapes.	Total	Years.	Heavy shapes.	Light shapes	Total.
1912	2,470,415	376,072	2,846,487	1916	2,649,961	380,003	3,029,964
1913	2,553,806	451,166	3,004,972	1917	2,575,810	534,190	3,110,000
1914	1,787,281	243,843	2,031,124	1918	2,438,126	411,843	2,849,969
1915	2,031,407	405,596	2,437,003	1919	2,136,424	477,612	2,614,036

All the heavy structural shapes were rolled from steel.

PRODUCTION OF MERCHANT BARS.

PRODUCTION OF MERCHANT BARS, SHOWING IRON AND STEEL MERCHANT BARS SEPARATELY, GROSS TONS, 1906–1919.

Years.	Iron.	Steel	Total	Years.	Iron.	Steel.	Total.
1906	1,481,348	2,510,852	3,992,200	1913	1,026,632	2,930,977	3,957,609
1907	1,440,356	2,530,632	3,970,988	1914	563,171	1,960,460	2,523,631
1908	685,233	1,301,405	1,986,638	1915	657,107	3,474,135	4,131,242
1909	952,230	2,311,301	3,263,531	1916	993,948	5,236,354	6,230,302
1910	1,074,163	2,711,568	3,785,731	1917	983,926	5,226,031	6,209,957
1911	835,625	2,211,737	3,047,362	1918	846,898	5,395,851	6,242,749
1912	944,790	2,752,324	3,697,114	1919	446,549	3,945,075	4,391,624

PRODUCTION OF CONCRETE BARS.

PRODUCTION OF CONCRETE BARS, SHOWING IRON AND STEEL CONCRETE BARS SEPARATELY, GROSS TONS, 1909–1919.

Years.	Iron.	Steel.	Total.	Years.	Iron.	Steel.	Total.
1909	.....	159,352	159,352	1915	.....	353,408	353,408
1910	4,645	236,464	241,109	1916	2,683	458,717	461,400
1911	2,388	256,353	258,741	1917	1,497	469,687	471,184
1912	2,500	271,832	274,332	1918	468	344,152	344,620
1913	113	319,557	319,670	1919	2,295	416,726	419,021
1914	.....	288,471	288,471	.....	.....	.....	.....

Statistics are not available prior to 1909.

PRODUCTION OF SKELP.

PRODUCTION OF SKELP, SHOWING IRON AND STEEL SKELP SEPARATELY, GROSS TONS, 1906–1919.

Years.	Iron.	Steel.	Total.	Years.	Iron.	Steel	Total.
1906	391,517	1,137,068	1,528,585	1913	312,746	2,189,218	2,501,964
1907	444,536	1,358,091	1,802,627	1914	264,340	1,718,091	1,982,431
1908	297,049	853,534	1,150,583	1915	262,198	2,037,266	2,299,464
1909	370,151	1,663,230	2,033,381	1916	355,445	2,572,229	2,927,674
1910	350,578	1,477,616	1,828,194	1917	336,591	2,337,640	2,674,231
1911	322,397	1,658,276	1,980,673	1918	258,500	2,305,511	2,564,011
1912	327,012	2,119,804	2,446,816	1919	192,146	2,363,632	2,555,778

In 1919, 41 plants in 5 States rolled iron or steel skelp, as compared with 42 plants in 5 States in 1918.

PRODUCTION OF MISCELLANEOUS ROLLED PRODUCTS.

PRODUCTION OF MISCELLANEOUS ROLLED IRON AND STEEL PRODUCTS, GROSS TONS, 1919.

Miscellaneous rolled products.	Iron.	Steel.	Total.
Hoops	.....	233,336	233,336
Bands and cotton-ties	389	351,783	352,172
Long angle splice bars, fish-plate bars, tie-plate bars, and other rail joint shapes	57,568	376,440	434,008
Rolled sheet piling, not including fabricated	.....	17,811	17,811
Railroad ties	.....	16,645	16,645
Rolled forging blooms, forging billets, etc	412	359,170	359,582
Blooms, billets, sheet bars, etc., for export	44	92,099	92,143
Spike and chain rods, bolt and nut rods, horseshoe bars, strips, shafting, tires, etc.	315,956	1,171,467	1,487,423
Total	374,369	2,618,751	2,993,120

PRODUCTION OF MISCELLANEOUS ROLLED PRODUCTS, GROSS TONS, 1915–1919.

Products.	1915.	1916.	1917.	1918.	1919.
Hoops	281,759	368,164	347,186	262,281	233,336
Bands and cotton-ties	437,987	562,555	490,893	250,767	352,172
Long angle splice bars, fish-plate bars, tie-plate bars, etc	535,615	691,820	606,824	416,905	434,008
Rolled sheet piling	24,026	19,196	18,606	11,689	17,811
Railroad ties	42,269	34,311	9,103	6,438	16,645
Rolled forging blooms and forging billets	650,545	2,015,960	1,801,706	1,659,118	359,582
Blooms, billets, sheet bars, tinplate bars, etc., for export	562,418	512,483	1,158,427	832,746	92,143
Spike and chain rods, bolt and nut rods, horseshoe bars, strips, shafting, tires, etc	1,227,455	1,669,228	1,797,802	1,793,734	1,487,423
Total	3,762,074	5,873,717	6,230,549	5,233,678	2,993,120

PRODUCTION OF TINPLATES AND TERNE PLATES

PRODUCTION OF TINPLATES AND TERNE PLATES, 1891–1919.

Years.	Tinplates.	Terne plates.	Total pounds.
1891 (second 6 months)	368,400	1,868,343	2,236,743
1892 (calendar year)	13,921,296	28,197,896	42,119,192
1893	64,536,209	59,070,498	123,606,707
1894	102,223,407	64,120,002	166,343,409
1895	165,927,907	88,683,488	254,611,395
1896	270,151,785	89,058,013	359,209,798
1897 (first 6 months)	203,028,258	49,545,643	252,573,901
1897 (second 6 months)			322,205,619
1898 (calendar year)			732,289,600
1899			808,360,000
1900 (cen. year end. May 31)	707,718,239	141,285,783	*850,004,495
1901 (calendar year)			894,411,840
1902			806,400,000
1903			1,075,200,000
1904 (cen. year end. Dec. 31)	867,526,985	158,857,866	*1,032,940,706
1905 (calendar year)			1,105,440,000
1906	1,100,373,000	193,367,000	1,293,740,000
1907	996,650,000	156,447,000	1,153,097,000
1908	1,048,896,000	154,179,000	1,203,075,000
1909	1,179,858,000	190,930,000	1,370,788,000
1910	1,450,821,000	168,184,000	1,619,005,000
1911	1,597,629,000	158,441,000	1,756,070,000
1912	1,965,659,000	191,396,000	2,157,055,000
1913	1,708,186,000	136,944,000	1,845,130,000
1914	1,939,785,000	146,195,000	2,085,980,000
1915	2,201,825,054	163,470,646	2,365,295,700
1916	2,552,224,275	214,176,952	2,766,401,227
1917	3,233,314,911	153,891,653	3,387,206,564
1918	3,216,247,675	85,376,569	3,301,624,244
1919	2,407,156,757	170,854,730	2,578,011,487

* Includes 1,000,473 pounds in 1900 and 6,555,855 pounds in 1904 of "other sheet iron and sheet steel, tin or terne plated."

PRODUCTION OF COKE AND CHARCOAL TINPLATES, 1919.

States.	Coke. Pounds.	Charcoal. Pounds.	Total. Pounds.
Pennsylvania	1,241,969,913	15,267,270	1,257,237,183
Maryland, West Virginia	433,276,032	23,215,195	456,491,227
Ohio, Indiana, Ill., Michigan	687,263,660	6,164,687	693,428,347
Total	*2,362,509,605	44,647,152	2,407,156,757

* Includes 8,343,250 pounds which were formed or stamped from black plates by companies which manufacture tinplates and tinned after the completion of the forming or stamping process.

PRODUCTION OF RAIL JOINTS AND FASTENINGS BY ROLLING MILLS AND STEEL WORKS.

PRODUCTION OF RAIL JOINTS AND FASTENINGS, SHOWING IRON AND STEEL SEPARATELY, 1918–1919

Articles.	1918—Gross tons.			1919—Gross tons.		
	Iron.	Steel.	Total.	Iron.	Steel.	Total.
Angle splice bars	3,663	134,001	137,664	1,944	109,225	111,169
Tie plates	36,713	125,168	161,881	51,314	153,896	205,210
Fish plates	652	10,135	10,787	427	11,423	11,850
Other rail joints	475	50,817	51,292	192	49,662	49,854
Total	41,503	320,121	361,624	53,877	324,206	378,083

It was necessary to estimate the output of one plant in 1919. The output of spikes, bolts, nuts, and similar fastenings is not included. There were 25 active works in 1919 and 24 in 1918.

PRODUCTION OF FORGED IRON AND STEEL BY ROLLING MILLS AND STEEL WORKS.

Years.	Production—Gross tons.			Years.	Production—Gross tons.		
	Iron.	Steel.	Total.		Iron.	Steel.	Total.
1910	20,410	299,452	319,862	1915	2,814	520,909	523,723
1911	4,034	214,202	218,236	1916	3,352	920,415	923,767
1912	9,155	383,365	392,520	1917	8,772	1,069,993	1,078,765
1913	27,892	380,091	407,983	1918	24,458	1,271,108	1,295,566
1914	3,675	337,746	341,421	1919	23,822	510,524	534,346

PRODUCTION OF GALVANIZED SHEETS.

PRODUCTION OF IRON AND STEEL GALVANIZED SHEETS AND GALVANIZED FORMED PRODUCTS, 1913–1919.

Years.	Galvanized sheets.	Galvanized formed products.*	Total. Pounds.
1913	1,845,864,365	129,189,480	1,975,053,845
1914	1,807,667,129	131,603,609	1,939,270,738
1915	1,581,569,206	112,192,790	1,693,761,996
1916	1,346,924,950	130,302,195	1,477,227,145
1917	1,273,978,805	114,902,171	1,388,880,976
1918	1,159,778,807	121,110,267	1,280,889,074
1919	1,500,575,548	140,494,884	1,641,070,432

* Articles formed or stamped from iron or steel black plates or black sheets and galvanized after the completion of the forming or stamping process

PRODUCTION OF CUT AND WIRE NAILS.

PRODUCTION OF WIRE NAILS IN 100-LB. KEGS, 1890–1919.

Years.	Production.	Exports.	Consumption.	Years.	Production.	Exports.	Consumption.
1890	3,135,911	18,395	3,117,516	1905	10,854,892	799,734	10,055,158
1891	4,114,385	18,986	4,095,399	1906	11,486,647	1,035,705	10,450,942
1892	4,719,524	21,387	4,698,137	1907	11,731,044	945,035	10,786,009
1893	5,095,945	27,451	5,068,494	1908	10,662,972	593,819	10,069,153
1894	5,681,801	38,920	5,642,881	1909	13,916,053	686,687	13,229,366
1895	5,841,403	53,012	5,788,391	1910	12,704,902	960,295	11,744,607
1896	4,719,860	95,638	4,624,222	1911	13,437,778	1,200,957	12,236,821
1897	8,997,245	129,767	8,867,478	1912	14,659,700	1,530,353	13,129,347
1898	7,418,475	307,190	7,111,285	1913	13,559,727	977,477	12,582,250
1899	7,618,130	750,781	6,867,349	1914	13,132,814	809,167	12,323,647
1900	7,233,979	613,858	6,620,121	1915	14,583,026	2,051,475	12,531,551
1901	9,803,822	420,506	9,383,316	1916	17,147,665	3,363,876	13,783,789
1902	10,982,246	595,391	10,386,855	1917	17,040,666	2,574,054	14,466,612
1903	9,631,661	704,546	8,927,115	1918	12,279,800	1,763,460	10,516,340
1904	11,926,661	734,554	11,192,107	1919	13,094,221	2,011,045	11,083,176

PRODUCTION OF CUT NAILS IN 100-LB. KEGS, 1890–1919.

Years.	Production.	Exports.	Consumption.	Years.	Production.	Exports.	Consumption.
1890	5,640,946	134,374	5,506,572	1905	1,357,549	176,741	1,180,808
1891	5,002,176	103,836	4,898,340	1906	1,189,239	169,519	1,019,720
1892	4,507,819	152,686	4,355,133	1907	1,109,138	155,212	953,926
1893	3,048,933	131,910	2,917,023	1908	956,182	157,319	798,863
1894	2,425,060	183,229	2,241,831	1909	1,207,597	222,565	985,032
1895	2,129,894	176,394	1,953,500	1910	1,005,233	182,087	823,146
1896	1,615,870	237,088	1,378,782	1911	967,636	255,854	711,782
1897	2,106,799	337,732	1,769,067	1912	978,415	208,568	769,847
1898	1,572,221	352,473	1,219,748	1913	842,038	84,885	757,153
1899	1,904,340	223,425	1,680,915	1914	769,665	76,676	692,989
1900	1,573,494	250,053	1,323,441	1915	775,327	94,878	680,449
1901	1,542,240	208,359	1,333,881	1916	764,835	106,451	658,384
1902	1,633,762	161,228	1,472,534	1917	461,674	101,362	360,312
1903	1,435,893	199,126	1,236,767	1918	418,811	85,668	333,143
1904	1,283,362	207,720	1,075,642	1919	394,477	65,423	329,054

PRODUCTION OF PIPES AND TUBES.

PRODUCTION OF WROUGHT PIPE AND BOILER TUBES, SHOWING IRON AND STEEL SEPARATELY, 1918–1919.

Kinds of pipe.	1918—Gross tons.			1919—Gross tons.		
	Iron.	Steel.	Total.	Iron.	Steel.	Total.
Black, standard	74,871	940,914	1,015,785	51,682	775,400	827,082
Galvanized	20,209	244,473	264,682	14,661	253,495	268,156
Oil country goods	67,136	727,633	794,769	73,522	995,392	1,068,914
O. D. and misc.	.....	91,157	91,157	.....	120,670	120,670
Boiler tubes	40,742	83,344	124,086	22,491	67,618	90,109
Total	202,958	2,087,521	2,290,479	162,356	2,212,575	2,374,931

In 1919 there were 25 active works, of which 19 made black, 16 made galvanized, 15 made oil country goods, 10 made O. D. and miscellaneous pipe, and 12 made boiler tubes.

PRODUCTION OF SEAMLESS STEEL TUBES, GROSS TONS, 1913–1919.

Years.	Hot finished.	Cold drawn.	Total.	Years.	Hot finished.	Cold drawn	Total.
1913	42,740	65,827	108,567	1917	87,615	139,060	226,675
1914	36,939	53,656	90,595	1918	142,308	150,586	292,894
1915	63,488	76,180	139,668	1919	75,864	121,505	197,369
1916	61,235	129,238	190,473	.....	.....	.....	.....

PRODUCTION OF CAST IRON PIPE, NET TONS, 1918–1919.

Kinds of pipe.	1918—Net tons.			1919—Net tons.		
	Pipe.	Fittings.	Total.	Pipe.	Fittings.	Total.
Gas and water*	455,319	52,981	508,300	469,735	44,929	514,664
Soil and plumbers'	80,089	31,284	111,373	142,989	52,428	195,417
Total	535,408	84,265	619,673	612,724	97,357	710,081

* Includes culvert pipe. Manufacturers able to separate their production report 12,577 tons of culvert pipe in 1919 and 16,770 tons in 1918.

PRODUCTION OF HAMMERED CHARCOAL IRON BLOOMS, BILLETS, ETC.

Years.	For sale	For own use.	Total. Gross tons	Years.	For sale	For own use.	Total Gross tons.
1910	14,016	67,958	81,974	1915	902	57,219	58,121
1911	2,271	70,345	72,616	1916	5,405	95,280	100,685
1912	250	75,557	75,807	1917	7,841	103,284	111,125
1913	80	71,313	71,393	1918	8,300	74,787	83,087
1914	5,026	46,399	51,425	1919	1,027	31,210	32,237

PRODUCTION OF FINISHED ROLLED PRODUCTS, SHOWING IRON AND STEEL PRODUCTS SEPARATELY, GROSS TONS, 1908–1919.

Years.	Iron.	Steel.	Total.	Years.	Iron.	Steel.	Total.
1908.	1,238,449	10,589,744	11,828,193	1914..	1,167,776	17,202,420	18,370,196
1909.	1,709,431	17,935,259	19,644,690	1915..	1,294,833	23,098,091	24,392,924
1910	1,740,156	19,881,123	21,621,279	1916..	1,822,571	30,557,818	32,380,389
1911	1,460,615	17,578,556	19,039,171	1917..	1,867,757	31,199,943	33,067,700
1912	1,637,582	23,019,259	24,656,841	1918..	1,573,976	29,581,778	31,155,754
1913	1,678,257	23,112,986	24,791,243	1919..	1,059,451	24,042,093	25,101,544

PRODUCTION OF ALL KINDS OF FINISHED ROLLED IRON AND STEEL, BY STATES, GROSS TONS, 1915–1919.

States.	1915	1916.	1917.	1918.	1919.
Maine, Massachusetts..	184,273	217,589	218,962	181,113	203,033
Rhode Island, Conn....	66,455	75,111	81,255	81,317	79,523
New York.....	994,334	1,322,988	1,492,769	1,640,182	974,928
New Jersey.....	181,017	235,739	238,972	217,480	204,180
Pennsylvania.....	11,992,840	15,428,563	15,018,871	13,836,445	11,477,176
Delaware, Virginia.....	25,647	37,337	62,403	41,584	79,279
Maryland.....	220,725	385,708	368,458	416,213	241,914
West Virginia.....	534,134	777,328	831,594	731,477	682,017
Kentucky, North Car...	169,571	332,797	322,444	239,224	184,675
Tennessee, Ga., Texas..	73,139				
Alabama.....	556,222	856,445	884,500	755,468	709,697
Ohio.....	4,733,612	5,846,024	6,141,465	6,171,332	4,975,254
Indiana.....	2,104,072	2,919,004	3,135,689	2,844,429	2,607,547
Illinois.....	1,889,964	2,686,674	2,713,428	2,470,223	1,679,107
Michigan.....	21,518	471,802	695,605	733,038	414,602
Wisconsin, Minnesota..	157,575				
Mo., Iowa, Okla., Kan.	81,042	150,603	146,386	115,085	103,803
Colorado, Utah, Wash..	356,924	518,043	573,660	514,170	355,138
California.....	49,860	118,634	140,239	166,974	129,671
Total.....	24,392,924	32,380,389	33,067,700	31,155,754	25,101,544

PRODUCTION OF FINISHED ROLLED IRON AND STEEL BY LEADING PRODUCTS, GROSS TONS, 1919.

Products.	Iron.	Steel.	Total.
Rails.....	.....	2,203,843	2,203,843
Plates and sheets.....	40,628	7,332,186	7,372,814
Nail and spike plate.....	738	12,094	12,832
Wire rods.....	1,956	2,536,520	2,538,476
Structural shapes.....	770	2,613,266	2,614,036
Merchant bars.....	446,549	3,945,075	4,391,624
Bars for reinforced concrete work.....	2,295	416,726	419,021
Skelp, flue, and pipe iron or steel.....	192,146	2,363,632	2,555,778
Hoops.....	.....	233,336	233,336
Bands and cotton-ties.....	389	351,783	352,172
Long angle splice bars, tie-plate bars, etc.....	57,568	376,440	434,008
Rolled sheet piling, not including fabricated.....	.....	17,811	17,811
Railroad ties.....	.....	16,645	16,645
Rolled forging blooms, forging billets, etc.....	412	359,170	359,582
Blooms, billets, sheet bars, etc., for export.....	44	92,099	92,143
All other finished rolled products.....	315,956	1,171,467	1,487,423
Total.....Gross tons.	1,059,451	24,042,093	25,101,544

In addition to the 17,811 tons of rolled sheet piling above reported there were produced by rolling mills and steel works in 1919 about 3,773 tons of fabricated sheet piling, as compared with 1,742 tons of the same kind of piling in 1918.

PRODUCTION OF FINISHED ROLLED FORMS BY STATES, 1918–1919, SHOWING IRON AND STEEL SEPARATELY.

States.	1918—Gross tons.			1919—Gross tons.		
	Iron.	Steel.	Total.	Iron.	Steel.	Total.
Me., Mass.....	23,112	158,001	181,113	19,164	183,869	203,033
R. I., Conn.....	9,832	71,485	81,317	6,230	73,293	79,523
New York.....	77,068	1,563,114	1,640,182	46,047	928,881	974,928
New Jersey.....	30,108	187,372	217,480	31,417	172,763	204,180
Pennsylvania.....	688,310	13,148,135	13,836,445	470,811	11,006,365	11,477,176
Delaware, Va....	22,889	18,695	41,584	13,468	65,811	79,279
Maryland.....	2,056	414,158	416,213	1,686	240,228	241,914
West Virginia....	5,241	726,236	731,477	.....	682,017	682,017
Ky., Tenn., N. C., Ga., Tex.	50,786	188,438	239,224	32,111	152,564	184,675
Alabama.....	4,579	750,889	755,468	1,694	708,003	709,697
Ohio.....	169,490	6,001,842	6,171,332	127,926	4,847,328	4,975,254
Indiana.....	204,535	2,639,894	2,844,429	138,005	2,469,542	2,607,547
Illinois.....	133,106	2,337,117	2,470,223	73,414	1,605,693	1,679,107
Mich., Wis., Mn.	3,766	729,272	733,038	5,157	409,445	414,602
Mo., Iowa, Okla.	89,385	25,700	115,085	70,158	33,645	103,803
Colorado, Utah, Washington..	39,810	474,360	514,170	4,192	350,946	355,138
California.....	19,904	147,070	166,974	17,971	111,700	129,671
Total.....	1,573,976	29,581,778	31,155,754	1,059,451	24,042,093	25,101,544

Of the total production in 1919 about 95.8 per cent. was rolled from steel, as compared with about 94.9 per cent. in 1918.

Of the total production in 1919, 45.72 per cent. was rolled in Pennsylvania, as compared with 44.41 per cent. in 1918; and in 1919, 19.82 per cent. was rolled in Ohio, as compared with 19.81 per cent. in the previous year.

In 1919 there were 402 plants in 30 States which rolled finished forms of iron or steel, as compared with 400 plants in 29 States in 1918.

PRODUCTION OF PLATES AND SHEETS.

PRODUCTION OF IRON AND STEEL PLATES AND SHEETS, 1890–1919.

Years.	Gross tons.	Years.	Gross tons.	Years.	Gross tons.
1890.....	809,981	1900.....	1,794,528	1910.....	4,955,484
1891.....	678,927	1901.....	2,254,425	1911.....	4,488,049
1892.....	751,460	1902.....	2,665,409	1912.....	5,875,080
1893.....	674,345	1903.....	2,599,665	1913.....	5,751,037
1894.....	682,900	1904.....	2,421,398	1914.....	4,719,246
1895.....	991,459	1905.....	3,532,230	1915.....	6,077,694
1896.....	965,776	1906.....	4,182,156	1916.....	7,453,980
1897.....	1,207,286	1907.....	4,248,832	1917.....	8,267,616
1898.....	1,448,301	1908.....	2,649,693	1918.....	8,799,135
1899.....	1,903,505	1909.....	4,234,346	1919.....	7,372,814

PRODUCTION OF PLATES AND SHEETS BY KINDS, 1918–1919.

Kinds.	1918—Gross tons.			1919—Gross tons.		
	Iron.	Steel.	Total	Iron.	Steel.	Total.
Universal plates*...	3,832	1,230,950	1,234,782	2,199	989,855	992,054
Sheared plates—						
Rolled on single stands.....	504	3,124,545	3,125,049	503	2,373,193	2,373,696
Roughed and fin. on sep. stands..	.....	760,077	760,077	3,070	522,501	525,571
Black sheets made on sheet or job. mills	10,321	2,063,318	2,073,639	34,712	2,065,128	2,099,840
Black plates, inc. black plates for tinning and black plate specialties rolled on tin mills..	.....	1,605,588	1,605,588	144	1,381,509	1,381,653
Total.....	14,657	8,784,478	8,799,135	40,628	7,332,186	7,372,814

*Include flats or bars over 6 inches wide.

PRODUCTION OF PLATES AND SHEETS BY SIZE AND MODE OF MANUFACTURE, GROSS TONS, 1919.

Kinds of products.	Iron.	Steel.	Total.
Universal plates, inc. flats or bars over 6 in. wide:			
¼ of an inch and over in thickness.....	2,199	936,275	938,474
Under ¼ of an inch thick.....	....	53,580	53,580
Total universal plates.....	2,199	989,855	992,054
Sheared plates:			
¼ of an inch and over in thickness.....	3,524	2,464,132	2,467,656
Under ¼ of an inch thick.....	49	431,562	431,611
Total sheared plates.....	3,573	2,895,694	2,899,267
Black sheets, made on either sheet or job. mills:			
No. 12 gauge and thicker.....	1,104	279,754	280,858
No. 13 gauge and thinner.....	33,608	1,785,374	1,818,982
Total black sheets.....	34,712	2,065,128	2,099,840
Black plates rolled on tin mills:			
Black plates for tinning.....	144	1,165,292	1,165,436
Other black plate specialties.....	....	216,217	216,217
Total black plates rolled on tin mills....	144	1,381,509	1,381,653
Grand total of plates and sheets.....	40,628	7,332,186	7,372,814

PRODUCTION OF SHEARED PLATES ACCORDING TO MODE OF MANUFACTURE, GROSS TONS, 1919.

Mode of manufacture.	Iron.	Steel.	Total.
Sheared plates, rolled on single stands of rolls:			
¼ of an inch and over in thickness.....	454	2,207,754	2,208,208
Under ¼ of an inch thick.....	49	165,439	165,488
Total rolled on single stands.....	503	2,373,193	2,373,696
Sheared plates, roughed and fin. on sep. stands:			
¼ of an inch and over in thickness.....	3,070	256,378	259,448
Under ¼ of an inch thick.....	....	266,123	266,123
Total roughed and fin. on sep. stands	3,070	522,501	525,571
Total sheared plates.....	3,573	2,895,694	2,899,267

PRODUCTION OF UNIVERSAL PLATES BY WIDTHS, SHOWING IRON AND STEEL SEPARATELY, GROSS TONS, 1919.

Width of universal plates.	Iron.	Steel.	Total.
Under 30 inches wide.....	2,199	771,533	773,732
30 inches wide, but under 48 inches wide.....	....	160,051	160,051
48 inches wide and over.....	....	58,271	58,271
Total.....	2,199	989,855	992,054

Columbus Meeting of American Foundrymen

New Record Established as to Exhibitors and Attendance—Endowment Fund For Prizes —New Foundry and Machine Tool Features

A NEW record was made this year by the annual convention and exhibition of the American Foundrymen's Association at Columbus, Oct. 4 to 8. In every respect it exceeds the large one held in Philadelphia last year. There were 240 exhibitors this year, against 208 in Philadelphia, and the attendance exceeded expectations. The individual registrations were at least 5000. At the technical sessions 67 papers were scheduled, most of which were presented, the attendance being large and enthusiastic. An interesting fact was that when all of the 75,000 sq. ft. of space allotted to exhibitors had been occupied, there were no vacant booths and no waiting list—an unusual coincidence. A feature was the assignment of the exhibitors by classification to several different buildings instead of under one roof as formerly. A commendable arrangement was a different program as to the technical sessions and other features, among which was the holding of the business session earlier than Friday morning. The inauguration of a smoker, held on Thursday evening, Oct. 7, was a decided success. A symposium on industrial relations was a prominent part of the technical sessions.

Endowment Fund Established to Reward Research

THE announcement of the establishing of endowment funds aggregating $21,000, for a special purpose was made at the annual banquet Wednesday evening by C. S. Koch, the association's president. It was received with enthusiastic applause as well as with complete surprise. Four prominent men in the industry and one company have donated certain sums, the income from which is to be used as an award for definite achievements in stipulated phases of the industry.

JOHN A. PENTON

J. H. WHITING

W. H. McFADDEN

J. S. SEAMAN

John A. Penton, president Penton Publishing Co., Cleveland, has donated a $5,000 endowment. It is expected that those who have the matter in charge will arrange that the income from this endowment will be used to prepare and present a medal or award to that individual who shall, as a result of research and experiment, develop a worthy or distinctive improvement in the process or processes of melting or refining ferrous or non-ferrous metals through the medium of the electric furnace.

J. H. Whiting, president Whiting Foundry Equipment Co., Harvey, Ill., was announced as the donor also of $5,000. It is stated that the income from this is to be devoted in a similar manner in the development or use of the cupola or open-hearth furnace.

J. S. Seaman, Pittsburgh Rolls Corporation, Pittsburgh, is the third one to donate $5,000, the income from which is to be similarly distributed. The special field to be benefited by this donation is to be decided later.

W. H. McFadden, Ponca City, Okla., formerly of Mackintosh, Hemphile & Co., and president of the association in 1907, is the fourth one to bestow $5,000 to this movement. As in the preceding case a decision is to be made later as to what phase of industry is to be rewarded.

The S. Obermayer Co., Cincinnati, was announced as the donor of $1,000 for similar purposes, the details to be determined later.

The management of these funds and the method to be pursued in making the awards in this new and significant movement are to be worked out later by the governing authority of the American Foundrymen's Association.

It is understood now, however, that the income in each case need not necessarily be awarded each year but that it may accumulate and only be bestowed when, in each particular case, the developments warrant the conferring of this reward.

The Technical Sessions and Some of the Papers

THE gray iron, steel and malleable iron sections of the foundry industry were all represented by valuable papers at the various sessions. The attendance was satisfactory and the interest lively in all cases. While no remarkably new developments were announced, the steady progress of the foundry industry as a whole was recorded.

Sessions on Gray Iron

One of the early technical sessions was that on gray iron and kindred topics, on Tuesday morning. It was rather unfortunate that the space devoted to this meeting was in one corner of one of the exhibition

buildings, as many in the room were unable to catch clearly much of the discussions following the reading of the papers.

Zirconium in Iron

The first paper was read by Dr. Richard Moldenke, on "Zirconium in Cast Iron." The paper emphasized the fact that whereas foundrymen are familiar with the actions of silicon, carbon, phosphorus, manganese and sulphur, very little is known about the special effect of vanadium, titanium, cerium, copper, nickel, chromium, etc. More of these newer elements are now coming into daily use, and the iron industry is experiencing a corresponding expansion into new fields of usefulness. In cast iron the elements involved seem to be divided into two groups; the first made up of those not readily removed by oxidization in ordinary good foundry melting practise. The second consists of the elements readily oxidized under conditions involving the presence of oxygen in the molten metal. The paper graded the elements according to ease of oxidizing. From tests made of deozidizers of cast iron, it seems that the first effect is the removal of oxygen present in combination with the iron, and the author stated that the addition of 0.10 per cent of titanium may remove all oxygen present in a ladle of molten iron and give results that are practically as good as if 0.20 per cent were used. Special attention to good melting practise was urged so that but little of an expensive alloy need be added to attain a desired effect. In making tests with ferrozirconium, an alloy containing 30.6 per cent zirconium was used. For the smaller percentages the metal behaved nicely and indicated a purifying action, but the larger percentages chilled the metal considerably, so that it was difficult to pour. The conclusion reached was that zirconium will do better service in steel than in cast iron.

The discussion on the paper covered many phases of foundry practise, and in reply to the question as to how high sulphur content affects the life of cast iron, it was stated that in isolated cases castings are improved by higher sulphur, but as a general thing the more sulphur added has a tendency to weaken castings. Two sets of tuyeres were shown to have no value in combating sulphur, but to result in bringing into the furnace more oxygen than needed. Mechanical charging was also discussed, and the point was brought out that it must be absolutely the same as hand charging to give good results.

Electric Furnace and Sulphur

George K. Elliott, Lunkenheimer Co., Cincinnati, read a paper on "A Note on the Electric Furnace and the Problem of Sulphur in Cast Iron. This paper was liberally abstracted in THE IRON AGE, Oct. 7.

During the discussion, Mr. Elliott stated that he had produced castings as low as 0.009 per cent in sulphur, but he did not think this advisable as, by prolonging the heat tremendously, it was an expensive operation. In the duplexing process it was estimated that it would require from 40 to 50 min. to cut sulphur from 0.130 to 0.05 per cent. The more shallow the bath the quicker the action in the removal of sulphur. In using electric furnaces it was generally agreed that it was not advisable to meet cold charges.

Machine Tool Castings

A. N. Kelly, Modern Tool Co., Cincinnati, described the methods employed in the production of machine tool castings. This paper was illustrated with lantern slides showing the methods employed in the work. In the production of milling machine tables small chills, treated with linseed oil, were found very satisfactory. In pouring, the molds were tipped at an angle of 6 degrees and much better results were secured than when they were poured on the level.

A paper describing the making of high grade iron castings for milling machine tables at the plant of the Brown & Sharpe Mfg. Co., Providence, R. I., was read by Leroy Sherman. Papers were also read by E. J. Fowler, San Francisco, on "Standardizing Gray Iron Castings for Analytical Determination;" Electrical Apparatus in a Modern Iron Foundry," by F. W. Egan, Pittsburgh; "The Foundry of the U. S. S. Prometheus," prepared by Lieut. R. F. Nourse, and "Approved Methods of Testing Molding Sands," by S. W. Stratton, of the U. S. Bureau of Standards, Washington. Discussion of these papers was held over to an afternoon session, at which also a number of reports of committees of the American Foundrymen's Association were presented.

Semi-Steel

Dr. Moldenke opened the afternoon meeting with a reference to the report of the committee to general specifications for gray iron castings on co-operate with the American Society for Testing Materials. He stated that it had been the work of the committee to attempt to find a suitable name for the higher grade cast irons as exemplified by the so-called high class semi-steel metal. Dr. Moldenke stated that after due deliberation the name of high test cast iron was offered. A committee recommended in this connection an increase to 0.12 for the deflection and 3500 to 3800 lb. for the transverse load in order that the purchaser might obtain a metal under the name of high test cast iron which would be much superior to the quality of metal so frequently sold under the name of semi-steel. Upon the completion of the report, Dr. Moldenke launched into the general question of proper cupola practise, pertaining particularly to the melting of so-called semi-steel. Reference was also made to the effect of high sulphur and its elimination through proper melting practise and the use of ferromanganese in the present practise.

Dr. Moldenke was asked as to the value of chemical analysis and this brought forth an interesting discussion on proper methods of sampling in order that the analysis might be of value. The analysis for combined and graphitic carbon was pointed out as of value only when the samples were uniformly and properly taken.

Reference was made to the paper by E. J. Fowler, Pacific Foundry, San Francisco, Cal., in which the value of carbon analysis was entered into thoroughly. R. F. Harrington, Huntspiller Co., Boston, pointed out the necessity for uniform methods of obtaining samples for all analyses and particularly urged the use of the standard arbitration test bar as a means of obtaining drillings suitable for carbon analysis.

The report of the A.F.A. Committee, advisory of the United States Bureau of Standards, by Richard Moldenke, was also read. This briefly covered the recommendations for the support by the foundry industry of proper research.

Sessions on Steel

Two sessions were devoted entirely to steel foundry and kindred subjects and for these 13 papers and two committee reports were allotted. They were held on Tuesday afternoon, Oct. 5, and Wednesday morning, Oct. 6.

Steel Foundry Molding Materials

The first steel session opened with a paper by R. L. Lindstrom, Canadian Steel Foundries, Ltd., Montreal, Canada, on "Obtaining Molding Materials for the Steel Foundry." The need for developing standards for molding materials was emphasized and a number of tests for determining the usefulness of sand and clay in the shop were discussed. The author stated that chemical analysis of sand and clay never did tell him anything, as simple tests made on clay for foundry facings with the same analysis but from different regions showed vast differences in fusion points and plasticity. The paper suggested that a specification for foundry clay could be worked up along the following lines: Plasticity, not less than 85; softening point, not less than 1600 deg. C.; fineness test, not less than 5 per cent shall remain on a 20-mesh sieve, and not more than 75 per cent on a 100-mesh sieve.

A general discussion followed on the question of sands and clays, during which many different experiences were cited with different materials. It was brought out that the rounded grains give much cleaner castings than the sharp ones, and that a higher silica clay mixed with pure silica ought to give the best results.

Patterns for Small Steel Castings

"Standardizing the Design and Construction of Patterns for Small Steel Castings" was the subject of a paper read by K. V. Wheeler, Lebanon Steel Foundry,

Lebanon, Pa. The author felt that the stock allowances for machining castings of similar design should be standardized, and that the relation between the cross section of metal to its length and breadth should be fixed by suitable limits.

The discussion brought out the opinion that pattern construction depended to a great extent on how many castings were required off a pattern. Pattern designers generally are not familiar with steel foundry practise, and do not realize conditions which patterns must meet. The whole field of pattern construction was covered and the suggestion was made that, before any definite action was taken steel foundrymen ought to agree among themselves as to what would constitute uniform allowances. The question of getting uniform castings from identical patterns was shown to depend on how the mold was rammed up and the temperature of the metal when poured. The whole subject of standardization of patterns was referred to the committee on steel foundry standards.

Molding Small Steel Castings

The paper by R. J. Doty, Sivyer Steel Casting Co., Milwaukee, Wis., "Some details in the Molding of Small Steel Castings," stated that while all foundrymen were agreed that a good facing sand should be strong, open or porous, few will agree on the ingredients to be used or the methods of mixing. The author said that a mixture which he had found to give very good results under varying conditions and with different grades of silica sand and clay in the production of green sand castings was made up of 216 quarts of heap sand, 24 quarts of new silica sand, 3 quarts of fire clay, 2 quarts of foundry flour and 4 quarts of silica flour. The question of facing was the most important the foundrymen have to deal with and he attributed this to the fact that sand mixtures are not watched with the same care as is bestowed upon the metal.

In discussing the paper Mr. Doty said that all kinds of sand were employed in the mixture described and found equally good. When the heap sand becomes close it is opened up by using new sand. Some suggestions for sampling sands were made, and it was the general opinion that daily tests of sand ought to be taken. The use of the microscope in selecting materials for foundry use was strongly advocated.

Pouring, Gating and Feeding

"Pouring, Gating and Feeding Steel Castings" was the subject of a paper read by R. B. Farquhar, Electric Steel Co., Indianapolis, Ind. The author described and explained the proper use of several kinds of pouring ladles. The subject of pouring was gone into thoroughly, special attention being given to proper temperatures. The subject of gating was discussed and the importance of careful feeding emphasized. The author cited instances in his own experience where problems had been met and overcome by careful attention.

A discussion as to the benefits of holding the ladle after pouring was participated in by many of those present. While the time depended to some extent on the kind and size of castings made, in the converter process 10 min. was the usual length of time the metal was held. In the case of electric steel castings, if the metal is hot and castings large it is advisable to hold the ladle for some minutes, but in the case of small castings better results are obtained by pouring immediately after tapping.

Electric Furnaces in Steel Industry

At this session there was scheduled a paper, "Status of the Electric Furnace in the Steel Industry," by Edwin F. Cone, associate editor, THE IRON AGE, New York. Because of delayed arrival this paper was read at the general topics session on Friday. A brief abstract follows:

The object of this paper is to present a general statement of the status of the electric furnace steel industry as of Sept. 1, 1920, without going into the details as to tables which THE IRON AGE brings out in its annual review number in January and to show in particular the place the electric furnace occupies in the foundry industry. The data here presented in abstract are based on replies from all of the companies selling such furnaces except one company which could not see its way clear to furnish even a general statement. The figures for that particular type therefore stand as of Jan. 1, 1920. The paper presents a comparison of the status on Sept. 1 and Jan. 1, 1920.

The progress of the steel industry as a whole so far as the number of furnaces installed or contracted for has not made the phenomenal progress which signalizes the non-ferrous industry. Evidently the peak in this important movement was reached during the war and the industry may be regarded as having established itself on a sound and slowly developing basis.

According to the data referred to, as published Jan. 1, 1920, there were in the United States and Canada at that date 363 furnaces of all types operating or contracted for in the steel industry; on Sept. 1 this figure had been expanded to 374 or a net increase of 11 furnaces. The increase has been wholly in the United States, the total now being 334 against 323 Jan. 1.

The data, besides showing a net increase of 11 furnaces in the steel industry in 8 months, also reveal the fact that a little over 50 per cent is credited to foundry operations. This estimate is not accurate, but is as near to reflecting actual relations as has been possible. Carrying the analysis a little further it may be said that there are about 175 furnaces making steel castings with 5 on malleable iron, 2 on aluminum steel castings, 3 on cast high speed tools and 2 on iron castings.

Contrasting the steel industry as a whole with the non-ferrous, it is surprising to find that in about three years the furnaces credited to the latter industry now exceed those credited to the steel industry. On Sept. 1, the total in the steel industry of 374 contrasts with 385 in the non-ferrous. As to foundry operations, the percentage of the total in foundries is about 33 per cent as against 50 per cent in the steel industry.

Discussing this paper C. R. Messinger, Sivyer Steel Casting Co., Milwaukee, Wis., recalled that in 1912 at the convention of this association the suggestion that electric steel furnaces might play a rôle in the steel industry met with violent opposition. The present contrast with that of 1912 is striking. He predicted that progress had not halted and that we should see the electric furnace more generally used in the gray iron industry. Mr. Cone added that, while this was undoubtedly true, a very wide use of such furnaces is about to begin in the chemical industry.

A paper describing a novel core oven was read by S. B. Phelps, Jones & Laughlin Steel Co., Pittsburgh.

C. S. Koch, president American Foundrymen's Association, presided at the second technical session on steel foundry topics held Wednesday morning. Much of this session was devoted to the subject of heat treatment.

Annealing with Pulverized Coal

"Annealing Steel with Pulverized Coal" was the title of a paper by C. H. Gale, Pressed Steel Car Company, McKees Rocks, Pa. The author stated that where the investigations were conducted a marked difference in the physical characteristics of steel was noticed after pulverized coal was substituted for gas and oil for the annealing furnaces. The tensile strength became greater and the carbon and sulphur content was increased. The average carbon content before annealing was 0.262 per cent and after annealing 0.287 per cent; the sulphur content before annealing was 0.043 per cent, after annealing 0.052 per cent. These elements showed the greatest increase after the first annealing. Thinking that possibly the fuel had a case hardening effect upon the steel, drillings were taken from test bars and these showed that the increase in sulphur and carbon is considerable near the surface, but decreases as the depth below the surface increases. Samples of malleable iron containing 0.044 per cent sulphur before annealing showed no increase in sulphur when annealed with gas, but the sulphur content was increased to 0.501 per cent when annealed with coal.

Mr. Gale, in reply to questions, said that the type of combustion chamber might make some difference with the results. In the foundry, referred to in his paper, the annealing furnaces had no combustion chambers. The coal was blown directly into the furnace and the metal could easily absorb the elements from the

fuel. The foundry was engaged in making only ordinary commercial castings, not alloy castings, which ran from 65,000 to 70,000 lb. per sq. in. in tensile strength. When pulverized coal was used the tensile strength was increased to 80,000 lb. per sq. in., but when they changed back to oil the tensile strength dropped back to 65,000 to 70,000 lb.

The annealing furnaces were ordinary furnaces that had been used for annealing malleable castings. Brinell tests of the castings were not made. Mr. Gale believed that these were the first tests that had been made along this line.

Cleaning Steel Castings

A. W. Gregg, Whiting Foundry Equipment Co., Harvey, Ill., presented a paper on "Cleaning Castings in a Steel Foundry." He said that the finishing department is where delays are most apt to occur and that probably the greatest problem which this department is called upon to solve is in securing labor. The work is hard and disagreeable under the best conditions, and the surroundings should be made as agreeable as possible and labor saving machinery should be used to the fullest extent. A creosoted wood block floor was recommended if the work is light, for with a good floor lift trucks can be used. Mr. Gregg said that a system of routing should be followed to eliminate unnecessary handling, and that the following routing would probably satisfactorily meet the conditions found in most steel foundries. Flogging, sandblasting, cutting off risers with a torch, welding, annealing, sawing risers, chipping, grinding and tumbling. Inspection after every operation was urged. Admitting that the finishing department is the part of the foundry in which it is most difficult to introduce a piecework or bonus system, the author declared that there is no other department of a foundry in which such a system is so necessary. His experience showed that piece work based upon the tonnage of castings handled, produced the best results. A finishing department of any size should have its own tool and store room.

Various points in Mr. Gregg's paper brought out considerable discussion. One of his statements was that all steel castings should be annealed, and that was questioned. In reply he stated that it was all right not to anneal some steel castings, but it was best to adopt this as general practice, since annealing assured resistance to shock.

The question was raised as to whether grinding should be done before annealing, or annealing before grinding. Mr. Gregg replied that the cleaning operations were carried out in his company's plant in the order he outlined in his paper, but what he wanted to insist on as being of the most importance was that a regular routing of cleaning operations should be followed. In some foundries he had noticed that men in the cleaning departments were not following a definite plan of routing in the various operations.

C. S. Koch said that the order of operations was a very important one and that the paper suggested to the foundrymen that they may not be following the best plan of routing. In reply to questions Mr. Gregg said that he arrived at the amount of oxygen used for cutting risers by both the square inch and tonnage systems, depending on the character of the castings. He expressed the opinion that the best practice is to draw castings from the annealing furnace as soon as they are heated to the proper temperature.

Electric Heat Treating of Castings

A paper on "Electric Heat Treating of Steel Castings" was presented by E. F. Collins, General Electric Co., Schenectady, N. Y. He said that in order that steel castings may possess the best physical properties of which the steel is capable, some form of heat treating is usually required. High grade steel castings may be no better physically through improper heat treatment or no heat treatment, than an inferior grade of steel castings that have been heat treated. Heat treatment of castings embraces the individual practice of normalizing, annealing and quenching or hardening at high temperature, usually followed by drawing at a lower temperature. Normalizing breaks up large crystals into finer grained structures. The purpose of annealing is to increase softness and ductility and facilitate machine operations, to eliminate coarseness of grain and to relieve internal strains. The ranges of temperature recommended for annealing were given, and etched specimens as cast, and after annealing, were reproduced. Seven factors affecting the uniformity of the product resulting from heat treatment were listed. Mr. Collins considered some form of resistance furnace as best adapted to heat treating steel. He said that the electric heat treating furnace was now being made with a capacity up to 2700 kw. and taking a charge of 320,000 lb., which may be in one or more pieces. Automatic control and a graphic record of temperatures was recommended.

An interesting discussion followed Mr. Collins' paper. One subject brought up was the cost of operating electric furnaces for heat treating. Mr. Collins in his paper had referred to four vertical electric furnaces used for heat treating gun forgings during the war and the cost for day and night operation during one month was $2.76 per ton. In reply to a question, he said this cost was for quenching and drawing and that the cost would probably be less for annealing. Some figures of other tests had been furnished him, but the cost of operation shown was so low that he did not care to present these figures. However, other tests are now under way.

The question was raised as to whether too much attention was not being given to the subject of heat treatment, four out of seven papers at the one session dealing with that subject, and whether the subject of making castings good enough to heat treat should not be given more attention. The opinion was expressed that less than 5 per cent of the castings rejected is due to metal defects. The chairman replied that many of the foundrymen wanted to improve their heat treating methods and he thought it advisable to devote a session to that subject. Mr. Collins added that he regretted that anyone considered the discussion purely a technical one, as he had intended to handle the subject in a practical manner. He did not claim that all castings should be heat treated. A foundry might start with such an inferior product that it would not get far with heat treatment. He referred to the fact that heat-treated steel castings are now being used for various parts for which forgings were formerly used.

A. W. Lorenz, Bucyrus Co., said that his company is heat treating some small castings such as pinions and rollers, and they were improved by the heat treatment, but they did not heat treat all their castings.

Mr. Collins, in reply to a question as to whether the maintenance of the heating elements was taken into consideration in the figures of cost of operating the electric heat treatment furnace that he had referred to, said that this was a matter about which they did not know a great deal. However, he went on to state that the furnaces regarding which he had given cost figures had been used in temporarily owned Government plants and kept in continuous operation during the war and that the resistors, used over a year in these furnaces, are now being placed in the large 2700 kw. furnace to which he had made reference. This furnace will be 105 ft. deep and 10 ft. in diameter. He also added that in the electric furnace there is no wear and tear on the refractories as in the fuel fired furnace.

Acid Electric Steel

"Making Acid Electric Steel" was the title of a paper by James W. Galvin and Chas. N. Ring, Ohio Steel Foundry Co., Springfield, Ohio, and read by the former. The author stated that the birth of the electric melting furnace was due to the desire to produce steel by a process under which oxidation is eliminated or reduced to a minimum. The electric furnace has been developed by electrical engineers and the unfamiliarity of these engineers and the manufacturers of these furnaces with the furnace operations involved, probably has led them to claim that the electric furnace can be operated by unskilled men. This was held to be one of the gravest mistakes connected with the development of the electric furnace in commercial practice.

The author held that in acid practice the furnace bottom should be cup shaped instead of saucer shaped,

or in other words should be rather deep with steep sides, and the lining should be put in so that no ledge is left in where the bottom meets the side walls. A bottom of this type permits the charging of more metal per heat and insures the lodgment of the charge more directly under the electrodes. In a furnace of this type it is also advisable to run the sand up on the back wall above the tapping holes as high as possible. It is the practice of their plant to run this sand up nearly to the roof of the furnace. The author said the scrap should be charged in a compact form. When charging the first heat for a days run, more metal should be used than is to be tapped off, so that a certain amount of liquid metal will be left in the furnace, in which the new charge is thrown. This will result in the whole charge being welded in a compact mass that offers a continuous passage for the current. At their plant the silican content is controlled by adding iron ore, the same as in the open hearth, before the high temperature is attained. The same method is employed to keep down oxidation.

A statement made in the paper brought out in the discussion the assertion that a manufacturer of electric furnaces to-day realizes that he must carry a staff of metallurgists. The statement was also made that there is such a thing as having the scrap in the furnace charge too compact.

Steel Castings to Specifications

A paper on "Making Steel Castings to Specifications" was presented by E. R. Young, Jr., Detroit Steel Castings Co. An abstract of this paper follows:

The author described the methods used in a case where more than 1000 consecutive heats were made, all meeting the requirements of United States ordnance department specifications for Nos. 2 and 3 cast steel. The manipulation of the steel to obtain the desired carbon content, the use of titanium as a deoxidizer and scavenger, and the method of heat treating were discussed in detail. The author stated that the steel making process employed in work of this kind is not of first importance, but declared that careful control of the chemical composition and heat treatment, together with the proper preparation of the test specimens, is essential. Referring to the latter requirement he stated that test bars and test bar blocks should be made in a mold and not in a core. The proper method of preparing test specimens was explained, and the author emphasized the need of avoiding retests as much as possible. In conclusion, he discussed the general significance of tests and test bars.

This paper brought out considerable discussion regarding specifications and tests. It was held that the foundry is responsible for the quality of the steel used and its tensile strength, but that it is not responsible for the design of the casting.

T. F. Baily, Electric Furnace Co., Alliance, Ohio, was scheduled for a paper on "Accurate Treatment of Steel Castings," but was not present. Fred Grotts, Holt Mfg. Co., Peoria, Ill., was also on the program, his subject being "Heat Treating of Steel Tractor Castings." Mr. Holt was not present but prepared a paper, abstract of which follows:

The method of heat treating low, medium and high carbon steel and alloy steel tractor castings was briefly outlined. The author also described the results obtained by each treatment and presented micrographs showing the changes in the structure of the steel. From the tests he concluded that the best results are obtained by the first annealing to break up the austenitic and martensitic structure into pearlite and ferrite, then heating to above the upper critical point and quenching in either oil or water, followed by reheating or drawing to relieve strains and to toughen or give shock-resisting qualities. Annealed manganese steel, he said, gives a high strength, low yield point and tough wear-resisting properties.

Session on Malleable Iron

At the malleable iron session Friday morning, Oct. 8, the first paper was read by A. M. Candy, of the Westinghouse Electric & Mfg. Co., Pittsburgh. The paper was transferred from the general session the same morning. It dealt with "Arc Welding and Cutting for the Foundry," and was illustrated with lantern slides. The author stated that the most important factors in welding are the physical and chemical characteristics of the material to be welded; the education of the supervisor and the skill of the workmen; the physical, chemical and electrical characteristics of the welding outfit and of the electrodes. He brought out that the chemical composition of a casting determines to a great extent the ease with which it can be welded, and that the higher the percentage of carbon or other alloying constituents the more difficult it is to weld. In the field of iron castings, many different grades are produced by varying the processes. Very fine grained, white cast iron is very easy to weld, while the other extreme is a very coarse grained gray iron in which the zone of fusion is very porous, due chiefly to the high carbon content of the cast iron. Welding of non-ferrous metals is particularly difficult, due to the relatively low melting temperature, which results in rapid oxidization forming large volumes of gas, producing porosity and slag inclusions in the deposited metal.

Electric Core Ovens

J. L. Jones, of the Westinghouse Co., in a paper on "Electric Baking of Cores," described tests made in electric core ovens with automatic controls. The tests showed that baking cores at a temperature of 400 deg. Fahr. for about one hour gave the best results. The principal conclusions drawn from observing the uses of electric core ovens are that uniformity of temperatures can be maintained, there is almost an entire absence of fumes which are injurious to the health of the workers, and that cores baked in electrically heated ovens are from 50 to 200 per cent stronger than when baked in other fuel fired furnaces. The element of production also enters into their use, as greater speed can be secured than with the old type.

Some "Notes on Malleable Iron," by Enrique Touceda, Albany, were read by the author, who described some experiments made with air furnaces, and also suggested some changes in open-hearth furnaces for malleable iron. He stated that if it was possible to control carbon in cupola malleable iron, just as good results could be secured as in other furnaces. He noted the great strides made in annealing oven construction and equipment, and emphasized the necessity for positive control of temperatures. The author stated that future advancement in the malleable iron industry must come through an improvement in plant organization and metallurgical apparatus.

Malleable Iron Fractures

"Fractures and Microstructures of American Malleable Cast Iron" was the subject of a paper by W. R. Bean, H. W. Highriter and E. S. Davenport, Eastern Malleable Iron Co., Naugatuck, Conn. The authors clearly explained the causes of various fractures of malleable cast iron that occur in regular melting practice. The characteristic distinguishing points between fractures of annealed malleable, ordinary gray cast iron, wrought iron, Armco iron and low carbon steels, were illustrated by photomicrographs thrown on the screen. Abnormal fractures caused by insufficient annealing, carburization during annealing, incorrect chemical composition, too rapid cooling during annealing, burning, white rims from nitrogen, galvanizing, quenching were illustrated and described.

Two papers by H. A. Schwartz, National Malleable Castings Co., Cleveland, described the new research department of that plant, and also the triplex process for making electric furnace malleable.

"Fuel and Combustion," a paper by Max Sklovsky, Deere & Co., Moline, Ill., went into the question of coal distribution and efficiency of utilization, and the progress made in recent years was noted. A paper, "Practical Malleable Annealing," was also presented by E. J. Lowry, the Oliver Chilled Plow Co., South Bend, Ind.

Report on Specifications

The report of the committee on specifications for malleable iron castings stated that no meetings had been held for the reason that no suggestions have been brought to its attention that necessitated its deliberations. There seems to be a general agreement that to date the present specifications fill the needs of the user with satisfaction, although an attempt was made at the committee meeting of the American Society for Testing Materials to lower the ultimate strength by several thousand pounds. This suggestion, however, was not approved.

Session on General Topics

A session devoted to general subjects was held on Friday morning with C. R. Messinger in the chair.

Concrete Foundry Floors

The first paper presented was one by Lieut. Col. H. C. Boyden, Portland Cement Association, Chicago, on "Concrete Molding Floors." The author analyzed the advantages of such floors and discussed the various steps necessary to insure the best results. He concluded his argument with a statement that it had been demonstrated that, in the case of two molders who were removed from a clay floor to a cement one, both doing the same work, their production on the concrete floor was increased 22 per cent.

In reply to a question as to whether any advantage was to be gained in the use of iron borings on the top dressing, Mr. Boyden said there had been fair success in some cases but the association was not advocating the use of any ingredients.

Foundry Equipment and Engineering

H. R. Atwater, the Osborn Mfg. Co., Cleveland, presented an abstract of his paper, "The Equipment of the Foundry—To-day and in the Near Future." According to the author, the work now being done in installing modern labor saving equipment in foundries is only the start of a movement which is bound to expand in the next five years. The disadvantages of hand power in modern competition are emphasized and a list of questions calculated to reveal shortcomings in casting plants is submitted. One of the present day evils is the improper care of equipment. Neglect and ignorance are responsible in many cases for the failure of machinery to properly function. The author suggests that a school be established for the purpose of training foundry workers in the rigging of equipment, its operation and maintenance, etc. A casting plant could be operated as a school and diplomas could be issued after apprenticeships had been served in it. In amplifying his abstract Mr. Atwater said that an investigation has shown that there are no schools teaching modern foundry practice.

A paper on "Foundry Engineering" by Frank D. Chase of Frank D. Chase, Inc., Chicago, was presented in abstract by the author. It was an interesting and fervent plea for the need of engineering methods in all foundry operations, even from the time of the selection of a plant site.

Foreign Molding Machines

An interesting paper, "Notes on European Molding Machines" by H. Cole Estep, *The Foundry*, London, England, was called attention to as affording enlightening information on certain methods and apparatus used in Europe.

The papers by Edwin F. Cone, THE IRON AGE, New York, on "Status of the Electric Furnace in the Steel Industry" and "in the Non-Ferrous Industry," were read at this meeting. They are abstracted in the report of the respective sessions to which they were originally assigned.

The report of the committee on safety, sanitation and fire prevention was read by C. H. Gale, Pressed Steel Car Co., McKees Rocks, Pa.

The Exhibition and Some of Its Features

THE foundry exhibition was in many respects the most notable display in the history of the foundry industry. The exhibits and the number of exhibitors were larger, and the floor space occupied greater, than on any previous occasions. It was the opinion that more interest was taken than in any previous convention. A feature was the many sales, one company reporting a business of $100,000 in furnaces.

The remarkable success of the exhibition was to some extent due to the admirable facilities provided by the Ohio State fair grounds for the display. The exhibits were arranged in seven buildings, built for exhibition purposes, in close proximity and adjoining the rooms in which the technical sessions were held. They were well arranged, being grouped together, one building being devoted to a certain line of equipment. Ample space was provided so that the exhibits were not crowded, and with the visitors scattered through the seven buildings, crowding was avoided in the various booths.

There were 240 exhibitors who occupied 75,000 sq. ft. of floor space, as compared with 208 exhibitors occupying 60,000 sq. ft. of floor space in Philadelphia last year. During the Cleveland convention in 1916 there were 148 exhibitors occupying 37,000 sq. ft. of floor space; during the following year in Boston there were 174 exhibitors, taking 44,000 sq. ft. of floor space, and in 1918, at Milwaukee, there were 194 exhibitors with 42,000 sq. ft.

Among the outstanding features was the large display of sand blast equipment and melting furnaces and a more extensive display of electric melting furnaces than ever before. The molding machine exhibit was very large and included a number of new types, and other new products shown in the various sections were numerous. There was a larger exhibit than ever of power-operated trucks which are being used in increasing numbers in foundries. The machine-tool exhibit was extensive and highly interesting, but not as large as on one or two previous occasions. However, it was fully as large as at the Philadelphia convention last year. Another feature was that more machinery was in actual operation than during any previous exhibition.

No attempt is made in this review to list more than the important products that are either entirely new or have been brought out during the past year and consequently are being exhibited for the first time.

Machine Tools

An interesting feature of the display of the Gardner Machine Co., Beloit, Wis., was a semi-automatic attachment applied to its vertical spindle horizontal disk grinders for eliminating hand labor and for continuous feeding for quantity production. This revolving attachment has four arms carrying face plates to which a fixture, or work holder, is attached, a special fixture being provided for each job. With this fixture, all the operator does is to load and unload the work holder. The face plate is fixed at right angles to the disk so that dimension work can be done. The attachment has three speeds, one revolution per minute, one revolution per two minutes and one revolution per four minutes.

The Heald Machine Co., Worcester, Mass., in connection with its display of grinding machines, showed a new internal grinder. This company also had on exhibition a new wheel head, with which its internal grinding machines are now being equipped. The new feature of this head is that it has ball bearings at the pulley end instead of bronze bearings. Bronze bearings are provided at the wheel end.

The Oliver Machinery Co., Grand Rapids, Mich., had in its exhibit a new motor head speed lathe for alternating current and a universal variety saw bench that has its motor mounted on the saw arbor. A feature of this exhibit was a standard pattern-making machine using ordinary milling cutters for aluminum pattern work. This machine is designed primarily for wood pattern work. The Oliver company's exhibit also included a new pattern makers vise.

The American Wood Working Machinery Co., Rochester, N. Y., in a display of wood working machinery for the pattern shop displayed a new direct motor-driven tilting arbor saw for general work. The saw is at the end of the motor shaft and the motor tilts with the saw.

Baker Brothers, Toledo, Ohio showed their regular line of machines and also demonstrated their single spindle drilling machines in drilling and reaming blanks, and also demonstrated drilling high speed steel

on a smaller machine. Tests of Hercules drills made by the Whitman & Barnes Co. were made on the Baker heavy duty drilling machines. In one test a 1¼-in. hole was drilled 3 in. deep in machinery steel at 442 r.p.m.; 0.060 in. feed per revolution, giving a penetration of 26½ in. per min. In another test a 1¼ in. hole was drilled 1½ in. deep; speed 422 r.p.m.; 0.096-in. feed per revolution, penetration 42.4 in. per min. In this test the strain on the machine was such that a safety pin was sheared.

An interesting machine of a new type was exhibited by the Racine Tool & Machine Co., Racine, Wis., this being designed for slotting, broaching and keysetting and being designated as a slotting machine of the milling type. This is an interior milling machine with a cutter resembling a broach held in a vertical position and given a reciprocating movement.

The Black & Decker Mfg. Co., Baltimore, Md., exhibited a new bench drilling stand. Features of this stand are that the bracket carrying the drill can be raised or lowered on the vertical column and is secured in a desired position by means of a split collar and clamping screw. The drill may be swung clear of the base. A long feed lever gives a feed ratio of 6 to 1. Studs are provided in the base for clamping work. Having a drill that swings clear from the base makes it applicable for drilling in the ends of shafts and for other work too high to be drilled on the bench.

The Kempsmith No. 2 Plain Maximiller was exhibited by the Osborne & Sexton Co., Columbus. This is similar in design to the Kempsmith No. 4 plain machine, but this size is adapted to use on medium heavy classes of automobile and other work. The table is 12 in. wide, with 56 in. working surface length. The over arm is a solid steel bar 4¼ in. in diameter.

The exhibit of metal sawing machines was very complete. This included a new metal cutting machine, shown by the Metal Saw & Machine Co., Inc., Springfield, Mass., having a capacity of 4 x 4 in. and using a metal cutting band saw 8 in. long by ¾ in. wide. This machine is similar in general design to the company's 10 x 10 in. machine and has been brought out to meet the demand for a metal cutting machine of smaller capacity.

E. C. Atkins & Co., Indianapolis, Ind., showed a new metal band saw, designed for general shop work up to 12 x 12 inches. One of its features is a gage which indicates the correct tension for the blade. Quick acting demountable vise jaws and a table slotted for "T" headed bolts are provided for clamping castings. The saw blade runs vertically. A positive automatic stop connected with the vise jaw stops the blade the instant the cut is completed, not allowing the back of the blade to pass through the cut.

Henry Disston & Sons, Inc., Philadelphia, exhibited a sectional interlocking toothed saw having a carbon crucible steel blade with inserted high speed steel teeth. The teeth are held in the blade by a special design of sockets and keys. This saw is said to be especially adapted for cutting high carbon steel and irregular shapes.

Molding Machines

The exhibit of molding machines was very large and included machines of practically all types, and a number of new machines were shown for the first time. The Osborn Mfg. Co., Cleveland, showed a number of new machines of various types, and included in its exhibit was a new jolt stripping and squeezing machine for making soil pipe and taking two patterns side by side. The machine can also be used for making other long molds. This company also showed a new automatic air operated counting valve for regulating the number of jolts, which may be applied to any of its machines.

The Wm. H. Nicholls Co., Inc., Brooklyn, N. Y., showed a new combination jolt and power squeezer with an electric magnetic pattern drawing device. The flash is put on the pattern plate, filled with sand and given a few jolts. The board is then put on the flask, rolled over and squeezed. The vibrator automatically starts and stops. A magnetic ram head holds the pattern plate while the flask draws away on the upward stroke of the piston. It is stated that a good clean mold is thus obtained without the use of screws, fastenings, leveling devices or adjustments. This company also showed a new combination jolt and power squeezer of the heavy inverted type that is especially adapted for split pattern work.

Henry E. Pridmore, Inc., Chicago, had on exhibition six types of machines. One of these was a new electric jolt hand stripping machine with push-button control. Another machine in this exhibit was a jolt squeezer that jolts 300 times per minute. The company believes that the use of a machine of this type with the rapid jolt will have a tendency to affect the operator and cause him to speed up on his work.

The Arcade Mfg. Co., Freeport, Ill., showed one new machine, a 4-in. jolt stripper. This machine is designed for a flask lift, although a stripping plate may be used. It is built with both round and square tables.

The R. J. Teeter Co., Muskegon, Mich., displayed for the first time the Howe suspended molding machine. This machine is suspended from an I-beam extending lengthways over the foundry floor and is held rigidly between the floor and an overhead beam by two compressed air legs. As the molder's work progresses towards the wall he turns a valve, releasing the air in the air legs, leaving the machine suspended on ball bearing wheels carried by the overhead beam. He pushes the machine a few feet toward the wall, turns the air valve, and the air legs are thrust down to the floor. In operation, a molder places the completed mold on the floor directly behind him and moves the machine along, having a window of sand on the right side and a row of flasks on the left, to be used as he progresses towards the wall. Having the machine close to the sand and flasks saves the molder's time.

The American Molding Machine Co., Terre Haute, Ind., exhibited two new machines. The larger one was a jolt roll-over pattern drawing machine, equipped with a single air cylinder which performs all the operations. A smaller machine also has one air cylinder and is entirely air operated except the roll-over operation, which is done by hand.

The Mumford Molding Machine Co., Chicago, showed a new two cylinder jolting roll-over and pattern drawing machine of 1200 lb. capacity. The operations are performed by air, a feature being that there is no stoppage in the rolling over.

The Chicago Molding Machine Co., Chicago, displayed a new machine of the portable squeezer type, constructed to straddle the sand pile. This machine is equipped with an electric riddle. The sand can be riddled over a flask of any length by swinging the riddle while in motion.

The U. S. Molding Machine Co., Cleveland, exhibited a jar squeeze roll-over pattern drawing machine for jolting and for drawing the cope and drag at the same time.

The Berkshire Mfg. Co., Cleveland, exhibited a new design of its universal molding machine which has the addition of a jolting device.

The E. J. Woodison Co., Detroit, Mich., had on exhibition a new core making device which can be bolted to any core making bench. The cradle holds a core box up to 12 x 18 in. with a draw up to 6 in. The machine is so designed that it can be operated by unskilled labor. The operator stands in one position throughout the entire process of making the core. The Woodison company also exhibited a new core machine for use with split core boxes. This machine will draw split core boxes up to 8 in. in depth with length and height unlimited. Two magnets placed horizontally against pads on the outside of the core box vibrate and draw at the same time, while another magnet holds the core plate firm. Two operators need but one machine, as it is fitted with knee pads on both sides and, while one is reaming the core box, the other operator draws. The Woodison company also showed a new pneumatic core making machine.

The Wadsworth Core Machine & Equipment Co., Akron, Ohio, exhibited a multiple motor driven core making machine. This is similar to this company's old single spindle machine, except that it has three spindles and is designed particularly for making bushing cores in quantities.

The Monarch Engineering & Mfg. Co., Baltimore, Md., exhibited a new permanent molding machine for making journal bearings.

Electric Furnaces

There was a larger exhibit of electric melting furnaces than at any previous convention, indicating the growing importance of electric melting furnace equipment in the foundry. Among these was a new repelling arc type furnace exhibited by the Industrial Electric Furnace Co., Chicago. This was a 300-lb. furnace designed for melting steel or non-ferrous metal. It operates directly on a power circuit, transformers not being required, so that the expense of substation equipment is avoided. This furnace has three 1 in. graphite electrodes, the flaming arc being suspended in a graphite crucible. It can be operated on either 3-phase, single phase or direct current.

The Booth Electric Furnace Co., Chicago, exhibited its new rotating electric furnace of 1000 lb. capacity, for melting non-ferrous metals. This has an automatic electrode control. Contact shoes are provided underneath the furnace, two on each side, for carrying the current to the electrodes.

The Detroit Electric Furnace Co., Detroit, exhibited a 300 kva. rocking type electric brass melting furnace of 2000 lb. capacity, and the Electric Furnace Co., Alliance, Ohio, a 75 kw. Baily hand-tilting furnace for melting brass and aluminum. The Campbell-Hausfeld Co., Harrison, Ohio, in addition to exhibiting melting furnaces, crucibles, etc., showed a new lifting apparatus for lifting covers of brass melting furnaces.

Sand Blast Devices

The display of sand blast equipment was complete and one of the very interesting features. The Standard Equipment Co., New Haven, Conn., showed a new line of radial sand blast barrels. In this barrel the abrasive automatically returns to the sand chambers which feed the sand nozzles, which operate from 8 to 10 in. from the work. The air nozzles are so arranged that nothing but air passes through them and all the rolls, gears, etc., are outside the blast. The blast nozzles are located in rows in cast steel cleats on the inside of the barrel. These blast nozzles are therefore on the periphery of the barrel and direct the blast into the center. The abrasive automatically returns to the blast nozzle by sifting through perforations in the shell into the sand chambers attached to the outside of the barrel. The abrasive is fed to the nozzles by gravity.

The Mott Sand Blast Mfg. Co., Brooklyn, N. Y., displayed a new sand blast barrel with one moving nozzle of the suction type inside of the barrel. The barrel has a double shell and the sand drops into a hopper and is siphoned back into the machine.

Trucks and Tractors

The tendency of foundries towards the more general use of trucks and tractors for handling material was reflected in a larger exhibit of this kind of equipment than at any previous convention. Five electric storage battery trucks and two gas operated trucks were on exhibition, and there was a very complete display of hand trucks and other transportation equipment. Included in the exhibit of power propelled trucks was a new 2-ton storage battery lift truck that has just been brought out by the Automatic Transportaion Co., Buffalo. This is built for a 46 in., 60 in. or 72 in. lift.

In handling equipment a new one man truck for handling steel bars was exhibited by the Sabin Machine Co., Cleveland. This is an all steel truck, except the wheels, and is equipped with a clamping device to which the top of the barrel is automatically clamped, the truck handles then acting as a lever in lifting the load, so that a helper is not needed. An attachment is provided for handling wooden barrels.

Other Features

The Whiting Corporation, Harvey, Ill., showed a new type of worm geared foundry ladle that is so constructed that the alignment of the gearing is not affected, should the bail become bent. This is now being made in a 2-ton capacity but will be manufactured in various sizes.

For the first time, at the foundry convention, coal pulverizing equipment was exhibited. This was a complete ¼ size model of its 4-roller mill for grinding coal, shown by the Raymond Bros. Impact Pulverizer Co., Chicago.

The display of core oven equipment, which was very complete, included a new portable electric oven recently brought out by the Ohio Body & Blower Co., Cleveland.

Another new product shown was a preheater exhibited by the Geist Manufacturing Co., Atlantic City, N. J., for use in foundries and other plants doing welding work requiring preheating or annealing. This preheater takes the place of a charcoal or coke fire and uses gas or oil as fuel. It consists of a heavy metal grating, between the bars of which is placed a special heat absorbing element, 6 in. thick. This heating element absorbs the heat and is said to afford a temperature which is the same at all points of the surface. The burners, arranged in rows, are located beneath the heat absorbing element.

The National Engineering Co., Chicago, displayed the Simpson bucket loader for Simpson sand mixers and other machines where mechanical loading is desirable.

An interesting event was the assembling of 150 alumni of the McClain System, Milwaukee, Wis., who were photographed. The system now has over 4000 students. Mr. McClain called special attention at his booth to hatchets and similar implements made of heat-treated semi-steel.

The Banquet and Smoker

A smoker held Thursday evening, Oct. 7, in the spacious auditorium of the Elks' Club, Columbus, was an innovation this year and a complete success. The business meeting introduced the evening's program. Pres.

W. R. BEAN

C. R. MESSINGER

New President and Vice-President

C. S. Koch read his annual address, which will be abstracted in a later issue of THE IRON AGE. A varied program followed in which Edward A. Guest, Detroit newspaper man and poet, recited some of his original poems and stories.

The annual banquet was held in the ball room of the Deshler Hotel on Wednesday evening, Oct. 6, at which Hon. Dr. Simeon D. Fess, member of Congress from Ohio, was the principal speaker. Edward Ford, New York, entertained the diners with an exceedingly witty and clever after-dinner speech.

New Officers

At the regular business session W. R. Bean, Eastern Malleable Iron Co., Naugatuck, Conn , was elected president of the association for the coming year and C. R. Messinger, Singer Steel Casting Co., Milwaukee, Wis., vice-president. C. E. Hoyt, Chicago, was re-appointed secretary-treasurer.

Reports of the sessions on industrial relations, on non-ferrous subjects, and abstracts of some of the committee reports will have to be carried over to the next issue.

LEIPZIG TECHNICAL FAIR*

Failure So Far as Machine Tool Sales Go—Improved German Machines

LEIPZIG, GERMANY, Sept. 17.—The Leipzig Technical Fair is over—and with a unanimity seldom met with the German industry admits that from a purely business point of view it was a "down and out" failure. Nor can it be said that the result came wholly unexpected, for it was plainly realized by interested circles prior to the opening of the fair that in view of the unabated stagnation of business in Germany it was idle to entertain hopes for a large volume of business. However, even the worst anticipations were surpassed and the keen disappointment felt in industrial quarters is being widely discussed. Various are the reasons that are advanced. Two facts stand out clearly: High prices and overstocking of the machinery producing countries.

It would be misleading to assume that the promoters of the fair were under a delusion when making the preparations. The determining factor was the deliberate idea of demonstrating before the entire world the productive capacity of the industry and the high standard of perfection of German machinery products. It was astonishing to see the rapid strides the German machine industry is making in returning to pre-war quality and efficiency. Substitute materials are fast disappearing.

As in former years, the exhibition of the Association of German Machine Tool Manufacturers was once more the focus of the whole fair. Automatic and semi-automatic machines were much in evidence, as were some fine specimens of turret lathes. The serviceableness of high-speed steel was once more plainly demonstrated and its effect upon the design and construction of machine tools, especially high-duty lathes, was clearly noticeable. A great variety of automatic screw machines showed that in this line of industry Germany is now producing machines equal to the best of American types. Another feature is the remarkable development in magnetic chuck design and use while as regards grinding machines several entirely new designs were exhibited, among which were some machines where the longitudinal movement of the grinding wheel was dispensed with, the entire width of the wheel being used for one operation.

There were about 3400 exhibitors, while the total number of visitors is estimated to have been say 34,000. Compared with the wealth of the exhibited products, the orders placed were insignificant. The marked absence of foreign visitors, especially from the United States and Great Britain, was generally commented upon.

Frankfurt Fair

A few more weeks and the third Frankfurt International Fair will be opened. An efficient propaganda campaign has been carried on during the past months with a view of rendering the fair a thorough success, but judging by the skepticism openly displayed on the part of manufacturers and the Leipzig disappointment still fresh in the memory of the manufacturing industry, there is no reason to assume that the result of that fair will in any way differ from the Leipzig show.

*Reported by C. A. Heise, assistant secretary American Chamber of Commerce, Berlin.

STEEL OUTPUT STATIONARY

September Statistics Substantially the Same as for August

Steel ingot production in the United States in September was substantially the same as in August—2,999,551 tons by 30 companies which made 85.12 per cent of the steel ingot production in 1919, as against 3,000,432 tons in August for the same 30 companies. Estimating the remaining production on the same basis, the September total for the country was 3,523,908 tons, or 135,535 tons per operating day, against an estimated August total of 3,529,920 tons, or 135,740 tons per day.

The table below from the report of the American Iron and Steel Institute gives separately the production of Bessemer and open-hearth steel ingots. In the last four months of 1919 no statistics were gathered, because of the steel strike. The figures are for 30 companies "which made 85.12 per cent of the steel ingot production in 1919":

Monthly Production of Steel Ingots by 30 Companies Which Produced About 85 Per Cent of Total in 1919—Gross Tons

	Open Hearth	Bessemer	All Other	Total
January, 1919	2,351,153	749,346	7,279	3,107,778
February	2,043,635	655,206	5,842	2,704,683
March	2,100,528	555,332	6,405	2,662,265
April	1,732,447	500,770	6,494	2,239,711
May	1,506,015	414,392	8,617	1,929,024
June	1,692,257	521,634	5,328	2,219,219
July	1,875,630	625,246	7,300	2,508,176
August	1,988,651	748,212	9,218	2,746,081
January, 1920	2,242,758	714,657	10,687	2,968,102
February	2,152,106	700,151	12,867	2,865,124
March	2,487,245	795,164	16,640	3,299,049
April	2,056,336	568,952	13,017	2,638,305
May	2,251,544	615,932	15,688	2,883,164
June	2,287,273	675,954	17,463	2,980,690
July	2,135,633	653,888	13,297	2,802,818
August	2,299,645	695,003	5,784	3,000,432
September	2,300,417	693,586	5,548	2,999,551

Austrian Steel Enterprise

WASHINGTON, Oct. 11.—Because of the need of iron and steel by Austrian manufacturing plants, this industry has a vital interest in the report sent to the Department of Commerce by its representative at Vienna, announcing the establishment there of an enterprise with a nominal capital of 30,000,000 crowns under the name of "Treuga" Actiengesellschaft fur Veredlungsverkehr und fur treuhandige Gutervertwertung (Vienna, III. Invalidstrasse 5). The essential purpose of this corporation, says the report, is to secure raw materials from abroad and have these materials fabricated into manufactured products by Austrian labor, which is ready and eager to work if the mills can be provided with the necessary raw materials. The "Treuga" is said to be well-supported by foreign capital and to have good connections abroad. This corporation states that when importing raw materials it will be able to assume all guarantees required and act as a responsible trustee for the foreign creditor. It is also stated that the Austrian law safeguards these raw materials as the property of the foreign creditor through the various stages of the manufacturing process.

Virginia Pig Iron Association

At a meeting of the Virginia Pig Iron Association at the offices of the Virginia Iron, Coal & Coke Co., Roanoke, Va., Oct. 5, the following, constituting all the pig iron producers in Virginia, were represented either directly or by proxy:

Princess Furnace Co., Glen Wilton.
Pulaski Iron Co., Pulaski.
Goshen Iron Co., Goshen.
Low Moor Iron Co., Low Moor.
Lavino Furnace Co., Reusens.
Intermont Coal & Iron Corporation, Big Stone Gap.
Edward E. Marshall, Graham.
Alleghany Ore & Iron Co., Buena Vista.
Virginia Iron, Coal & Coke Co., with general offices at Roanoke.

The purpose of the association is the discussion of the various problems of the pig iron industry in Virginia, the consideration of methods for improving the product and the gathering and distribution of statistics concerning the operation of the furnaces in Virginia. The election of officers resulted in the choice of the following for the coming year: President, Charles E. Loxley, vice-president Princess Furnace Co., Philadelphia; vice-president, R. S. Lackey, treasurer Alleghany Ore & Iron Co., Buena Vista, Va.; secretary and treasurer, C. E. Bertie, assistant to the president, Virginia Iron, Coal & Coke Co., Roanoke, Va.

CONTENTS

Revealing Macrostructure of Iron and Steel 965

Hitherto Overlooked Use of Ammonium Persulphate—Particularly Valuable for Indicating Crystalline Condition

Effect of Zirconium in Cast Iron 968

Elements Graded as to Oxidation—Effect of Temperatures—Results in Steel More Promising

Safe Practices in Blast Furnace Operations 971

Gas Most Serious Hazard—Need of Care in Use of Helmets—Hot Metal and Cinder Burns—Skip Hoist Accidents

Electric Smelting of Montana Manganese 973

Practice of Anaconda Copper Mining Co. in Making Ferromanganese—The Furnaces and the Charge

British Researches in Non-Ferrous Alloys 983

Corrosion of Condenser Tubes Among Topics of Meeting of Institute of Metals—Manganese Bronze and Other Alloys

Columbus Meeting of American Foundrymen 988

New Record Established as to Exhibitors and Attendance—Endowment Fund for Prizes—The Exhibition

Rolling Mill Theory 969
Inclinable Press 970
Sloss-Sheffield Storage Yard 970
August Manganese Imports Heavy 970
Ornamental Iron and Bronze Makers 972
Industrial Cost Association Meeting 976
Price Fixing by States 976
Production at Youngstown 977
Bench Drilling Stand 978
Ore Plenty in Mahoning Valley 978
Oil Heater of Straight Tube Type 978
Union Power Waning in England 979
Industrial Truck with Trailer Attachment 980
New Non-Corrosive Alloy 980
Exhauster Attachment Surface Grinder. 980
Sheet and Tin Plate Makers on Price Guarantees 981
Privately Owned Fleets Increasing 981
More Open Top Cars for Coal 982
Superior Ore Shipments in September .. 984
Iron and Steel Production, 1919 985
Leipzig Machinery Fair 996
September Steel Output 996
Austrian Steel Enterprise 996
Virginia Pig Iron Association 996
Editorials 998
The New Day of the Foundry—Against Price Guarantees—Iron Castings from Electric Furnaces—Railroad Investments and Returns—Steel Production in 1919
Correspondence 1000
Conditions in Seattle—Strength of Riveted and Welded Joints.
Foreign Market Conditions 1014
Refractory Market 1015
Steel Corporation's Orders 1020
New Trade Publications 1029
Office Changes 1029

Iron and Steel Markets 1002
Comparison of Prices 1003
Non-Ferrous Metal Markets 1016
Prices Finished Iron and Steel, f. o. b. Pittsburgh 1017
Personal Notes 1018
Obituary Notes 1019
Machinery Markets and News of the Works 1021
New York Jobbers' Prices 1030

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY WILLIAM W. MACON GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

Member of the Audit Bureau of Circulations and of Associated Business Papers, Inc.

Published Every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

W. H. Taylor, *President and Treasurer* Fritz J. Frank, *Vice-President* George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation, 243 West 39th Street, New York. H. M. Swetland, *Pres.* Chas. G. Phillips, *Vice-Pres.* W. H. Taylor, *Treas.* A. C. Pearson, *Secy.*

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: Tremont Building. Philadelphia: Real Estate Trust Building. Cleveland: Guardian Building. Cincinnati: Mercantile Library Building. Washington: 613 Fifteenth Street, N. W. San Francisco: 320 Market Street.

Subscription Price: United States and Possessions, Mexico, Cuba, Shanghai, $6.00; Canada, $8.50; Foreign, $12.00 per year. Single copy, 50 cents.

Entered as second class matter, June 18, 1879, at the Post Office at New York, New York, under the Act of March 3, 1879

The New Day of the Foundry

It is a far cry from the struggling foundrymen's associations of the latter eighteen-nineties to the highly successful convention and exhibition of the American Foundrymen's Association at Columbus, Ohio, last week, with its registration of 5000 foundrymen and foundry equipment manufacturers. Twenty odd years ago an article on the status of the American foundry was not complete without a reference to the backwardness of the molding shop and to the favoritism always shown the machine shop in spending money for equipment. It was so difficult in that day to get together a program for a foundry convention and to find persons competent to discuss the selected topics, that the American Foundrymen's Association for several years led a precarious life, even with the stimulus of the social accompaniments which then took precedence of the so-called technical sessions. The foundry literature of the time, when it was not a highly militant discussion of test bar sizes and shapes, was largely the threshing of old straw on "the influence of the various metalloids on the properties of iron castings."

With all due emphasis on the progress that has been made in the scientific mixing and melting of iron, the new day of the foundry is largely the creation of the mechanical engineer. The foundryman was in the grip of an apprentice ratio that put him more and more in the hands of the shop committee. Machines have sprung up and the ratio between workers and total output has been revised without waiting for a union referendum. The labor side of the problem was so pressing that perforce the developments in the displacement of hand labor by machines were more marked than those in metallurgy, highly creditable as the metallurgical advance has been.

It is easy to see that the foundry was bound to get some of the same consideration that long had been given to the machine shop, when the molding machine, handling equipment and the new shop construction called for by the foundry engineer yielded economies never dreamed of in the eighteen-nineties. Ever since the exposition of foundry appliances took its place as the important feature of the annual foundry gatherings, each year has brought a greater convention than any of its predecessors.

An outstanding feature of the Columbus convention was the announcement of four donations of $5000 each, the income from which will be awarded in recognition of meritorious work in foundry research and invention. The donors have done well in choosing the foundry field for the stimulation their generous gifts will afford and may feel assured that with such encouragement it will go on to new honors. The Columbus convention certainly marks the high point thus far in the latter-day foundry advance—the most noteworthy advance, perhaps, in the metalworking industries in the last two decades.

Against Price Guarantees

Manufacturers of sheets and tin plates took a commendable stand before the Federal Trade Commission last week against any kind of a guarantee by manufacturers against price decline. The practice which existed for so many years, of allowing buyers to place blanket orders which really amounted to nothing more than options, was no credit to the steel industry, but it persisted because it was encouraged by mills, anxious to dispose of their product in dull times, and willing to take chances of being compelled to accept cancellations or revisions of contracts when prices receded.

In recent years considerable progress has been made toward better practice in respect to contracts. Mills have discouraged the placing of orders for far-distant delivery and have shown more firmness in insisting that contracts be lived up to. The manufacturers represented at the recent meeting of the Federal Trade Commission have been leaders in the effort to get away from old practices, and it was natural for their representatives to protest against any encouragement of those who would like to see the guaranteeing of prices made more general.

One reason for believing that the readjustment in prices now under way will proceed in an orderly manner, avoiding the disastrous experiences of

other years, is that consumers have bought conservatively and business is on a sounder basis than in the days of promiscuous placing of contracts that were subject to revision.

The Federal Trade Commission will do well to set its face firmly against the vicious trade practices which the sheet and tin plate manufacturers have so vigorously opposed. It may be true, as a representative of the National Association of Purchasing Agents said, that "if a price guarantee is not allowed, buyers will hold up their long term commitments." That is exactly what the wisest men in the steel trade are trying to prevent—commitments which encourage speculation and disregard of contracts, injecting into business a sense of irresponsibility that tends to unsettlement and demoralization.

In the steel industry, as in many others, the buyer is also a seller, and in the former capacity is entitled to no exemption which should not in turn be granted to his customers and so on all down the line. Producers have quite well threshed out this whole subject, and theoretically have established a definite code on contract obligations. During the war it was not seriously tested and conditions since the war, as is well known, have put the market almost entirely in the seller's hands. Now that the old discussion is revived, the producers may well wish that the precedents set by the War Industries Board in 1917 and 1918, in readjusting all prices to the successive changes announced by the Price Fixing Committee, be relegated to the limbo of war expedients that have no place in the business structure of peace time.

Iron Castings from Electric Furnaces

About two and one-half years ago, at a convention of the American Electrochemical Society held in New York, the attention of metallurgists was called to the use of the electric furnace as an adjunct to the cupola for making special high grade iron castings. A superior metal was produced by a Cincinnati company and the process was called duplexing with the cupola. It elicited much interest.

While the use of this process has not spread rapidly, its possibilities were referred to then by Dr. Richard Moldenke, who pointed to it as the probable solution of the cast-iron sulphur problem, which war conditions had intensified. At the foundrymen's convention last week George K. Elliott, the author of the original paper, discussed the sulphur problem in cast iron and its solution by the electric furnace. That there is such a problem is not doubted and the advantages of its solution electrically are many. These were discussed by the author in the abstract of his paper published in THE IRON AGE last week.

The question is not one of the almost complete elimination of sulphur from the iron, which is possible, but of determining the relatively safe limits as to both phosphorus and sulphur and then approaching these. At present sulphur is regarded as a menace in cast iron, due to its rapid increase. There are also accomplished, in the use of the electric furnace, a superheating and refining of the cast iron which bestow marked properties. Without doubt we are entering upon an era in which the rôle of the electric furnace in the gray iron foundry is to be quite as important as in the steel or non-ferrous field. There the strides have been rapid, particularly in the latter. Already a large American maker of cast-iron pipe is duplexing with the cupola in making electric pipe, which are said to have greatly enhanced properties over the older method. Even blast furnace hot metal can be thus manipulated. The future is bright for a process which can solve the sulphur problem as well as bestow unusual benefits on the products.

Railroad Investments and Returns

The fact that railroads when borrowing money must pay more than 7 per cent, while the earning rate to March 1, 1922, as set by the Transportation Act, is 5½ or 6 per cent on their valuation, may be viewed variously. The Southern Pacific, the New York Central and the Pennsylvania have all had to pay more than 7 per cent, so that there is no reason to suppose that other roads will be able to do better. The Interstate Commerce Commission has given the railroads the limit permitted, 6 per cent, or at least has fixed rates expected to produce 6 per cent; but there is still a discrepancy of more than 1 per cent at least, and the railroads are in the delicate position that their expenditures might be questioned by the valuation authorities on the ground of being made at too high prices, while they can hardly profit by increases in market prices after they have made purchases.

Plainly the situation is an awkward one. From one viewpoint it may be urged that the Transportation Act is wrong, in having provided the railroads with something that seemed sufficient, but is now shown by actual conditions to be insufficient. Obviously the railroads cannot make money by borrowing money at one rate and receiving returns at a lower rate. The one plain resource of the railroads lies in Government advances, but such an operation cannot go very far.

From another viewpoint the propriety of 7 and 8 per cent interest rates can very properly be questioned. It is altogether fallacious to argue for a moment that because commodity and wage rates have greatly advanced interest rates should also be higher. There is no connection whatever. One is a matter of the value of the dollar, the other is a percentage. The $100 that is loaned has a lower purchasing power to the lender and the borrower, and the $7 or $8 a year paid for its use has a correspondingly depreciated buying power in the case of each party.

While the reduced purchasing power of the dollar cannot in the slightest degree justify an increase in interest rates, a host of other circumstances could justify an increase. In the search for justification one may consider whether the demand for capital is abnormally large at this time, but that is not the case. Construction costs are such that there is no unusual disposition to convert liquid into fixed capital. Nor does it appear that the supply of capital, in proportion to legitimate needs, is particularly small.

The one outstanding circumstance that is seen is that incomes from railroad securities are heavily taxed by a law, the existence of which at the present time no one attempts to defend. The Congress that did good work in enacting the Esch-Cummins law should not have undone a large part of that good work by leaving the income tax law in force. The Transportation Act as a work of art is admirable. However, it is needed not as a work of art but as a practical working measure, and with respect to the need of capital by the railroads it is made a failure by the tax system being allowed to continue.

Eventually, no doubt, something remedial will be done. Meanwhile the railroads will have to make the best of the situation, and it is cheering to observe that railroad men are showing an eager spirit to do their best. As never before they have the cordial good wishes of the public and the press.

Steel Production in 1919

The official statistics of steel production in 1919 just compiled, show an output of 33,694,795 tons of steel ingots and 976,437 tons of steel castings, making a total for the two items of 34,671,232 tons. This bears out the estimate made in this department of THE IRON AGE of April 8 last that it seemed probable that "the production of steel ingots and castings in 1919 was a trifle over 34,000,000 gross tons, or somewhat more than has been assumed by those who used old factors in estimating steel production from pig-iron production." The point was that the production of steel should not be estimated directly from the production of pig iron as a whole, for the reason that the production of foundry grades of pig iron was not increasing as was the production of steel-making grades, and thus there is a tendency for the ratio of steel production to pig-iron production to increase year by year.

The statistics showing the distribution of steel according to manufacturing processes, indicate a continuance of previous trends. There was a further gain in the proportion of basic open-hearth steel to total steel, at the joint expense of acid open-hearth, Bessemer and crucible. As to Bessemer steel, it is now holding its own fairly well, after the great backset it received in a period of a few years beginning with 1907. There is no sign that the Bessemer process is marked for extinction as long as there are Bessemer ores available, and with the reduced rate of production Bessemer ores will last longer than used to be estimated.

The acid open-hearth process is still more clearly marked as being of particular value for the manufacture of steel castings. The proportion of acid to basic open-hearth castings has easily held its own as compared with conditions of ten or fifteen years ago, while in ingots the proportion has gone down. A convenient illustration is this, that the total production of acid open-hearth steel in 1919 was 1,229,382 tons, and of this 36 per cent was in castings, while in 1907 there was approximately the same total production, but only 30 per cent was in castings.

Electric steel made a good showing in 1919. It is true the production, 384,452 tons, was well below the 1918 output, 511,364 tons, but the latter was particularly a war-time output, due to special requirements. Barring 1918, the 1919 output was the largest on record. It is impressive to note that while the total steel production in 1919 was much less than in either 1916 or 1917, the electric steel output was much greater, and the electric process is seen not to be one associated particularly with the manufacture of castings, since the 1919 output was divided into 272,942 tons of ingots and 111,510 tons of castings.

The proportion of rolled steel to steel ingots in 1919 was 71 per cent, comparing with the 76 per cent that may be considered normal, and reflecting probably the results of the industrial unrest which characterized the year. The rolled steel output was 24,042,093 tons, which with 1,059,451 tons of iron made a total of 25,101,544 tons of rolled material, including rolled forging blooms and billets, also ingots and semi-finished steel exported.

The rolled iron output suffered a particularly large decline in 1919, as the 1,059,451 tons produced compares with 1,867,757 tons produced in 1917. The maximum output of rolled iron in the past quarter century or thereabouts, or since steel became the dominant material, was the 2,200,086 tons produced in 1907.

The question was much discussed ten years and more ago, where could the basic open-hearth steel industry find scrap to support the continued growth to which it aspired? The chief hope then held forth lay in the processes that aimed to reduce or eliminate the desirability of scrap in the heat. However, additional supplies of scrap have come from other sources. Naturally the outcome of scrap increases year by year with the growth of the iron and steel industry as a whole. The iron mills, instead of increasing their operations are producing less, so that the percentage they use of the total scrap supply has decreased very considerably. The iron foundry industry is no doubt growing, but it does not grow as rapidly as does the production of scrap. Thus the basic open-hearth industry commands a larger proportion of the total scrap supply than formerly.

CORRESPONDENCE

Conditions in Seattle

To the Editor: We note in your issue of Sept. 2 an article entitled, "Shipbuilding Slows Down." We quote certain portions of the article that we believe should be amended:

"The two main industries of Seattle, lumber and shipbuilding, are at a practical standstill."

"All the lumber merchants here are doing practically nothing, and they do not see any early relief in sight."

"The closed shop is the rule . . ."

" . . . employers find it simply impossible to operate an open shop under the present conditions."

These and other assertions are either not true, or true only in part, and their whole tone is indicative of a condition much more serious than actually exists.

The statement regarding shipbuilding in this vicinity is substantially correct. Following the completion of

ships ordered during the war, that industry, as might be expected, slackened, and at present there is very little being done. However, to place the local lumber industry in the same category is most unfair. Business in that line for months has been very brisk. Recently there was a slackening, due to the annual July shutdown, but the condition is by no means alarming, and no serious trouble is anticipated. All mills in this vicinity are running at the present time.

An Open-Shop Center

In approaching the question of open shop, we would say that the portion of your statement regarding the impossibility of operating an open shop is entirely mistaken. In some few lines, on account of the impossibility of obtaining trained employees outside the union ranks, it is impossible to run under open-shop conditions. However, in the printing industry, a highly skilled trade, the open shop, or American plan, is in vogue, and has been for more than a year. For more than twelve months the master builders have been on the open shop; the waterfront employees, of whom there are thousands in this large center of shipping, are open shop; the tailors, dyers and cleaners, pile drivers and many other industries, besides individual businesses in other lines, are open shop, and are successfully carrying on business under that plan.

Previous to one year ago such was not the case. Seattle was, as your correspondent states now is the case, practically a closed shop town. But that time has passed. Many industries are still closed shop, but they are becoming fewer. The Associated Industries of Seattle, it might be stated, has had much to do with bringing this condition about.

There is at present not one single strike, large or small, in the city. There has been none of consequence for months. There are very few men out of work. A report made to the Government one week ago by their representative showed approximately 1000 men unemployed, and these men could have work if they chose to go to the environs of the city instead of remaining in Seattle proper.

A recent industrial survey was made by this association, and results are quoted for your information. A questionnaire was sent out to the members of the Associated Industries, numbering approximately 2000. Replies were received from 825 firms, from which were elicited the following data:

Number of firms responding	825
Total number of employees	26,462
Number of union employees	4,405
Number of non-union employees	22,057
Annual payroll	$41,176,706
Amount going to union men	6,722,568
Amount going to non-union men	34,454,138
Approximate gross volume of business (annual)	336,628,561
Average wage, union employee	1,526.10
Average wage, non-union employee	1,562.04

In interpreting these figures it should be borne in mind that the 825 firms represented are representative of all lines of industry; that both male and female employees are included, and that all employees from office boy to manager, and from apprentice to first-class machinist, are taken into account.

To sum up, we feel that an injustice has been done by the article in question. Business conditions, while rather quiet, in no sense warrant the dark picture painted by your correspondent; and the labor condition is improving monthly, both in respect to unemployment and to stability of industry.

ALFRED BICKFORD,
Executive secretary Associated Industries of Seattle.
Sept. 17.

Strength of Riveted and Welded Joints

To the Editor: In order to test the relative values of riveted, electric arc welded and acetylene welded joints, samples were made up a short time ago by a steel company and tested with the following results.

The pieces of steel plate were all ⅝ in. thick and 8 in. in straight section, such as are generally made for the purpose:

Samples and Preparation	Breaking Strain Lb.	Length After Break In.	Per Cent Efficiency
Original piece of steel plate	58,600	8.80	97.66
Lap joint, electric arc welded	54,800	8.94	91.33
Lap joint, riveted and welded	54,200	9.22	90.33
Butt joint, electric and welded	47,800	9.28	79.66
Butt joint, acetylene welded	36,800	8.23	61.33
Lap joint, rivet only	35,000	....	58.33

It will be evident from the foregoing that, while the nominal strength of the stock was 60,000 lbs. per sq. in. it was really a comparatively poor lot of steel plate, although the tests show quite conclusively the relative merits of the various methods of making joints. Those which were lapped and welded both sides with the arc and without rivets would probably have shown an efficiency of 100 per cent if the steel had been up to standard quality, and those which were riveted and welded in place of caulking should have shown better than 95 per cent.

Some tests made recently by one of the locomotive builders on electric arc welded steel plates with a nominal strength of 56,000 lb. per sq. in. showed:

Plate Thickness, In.	Elastic Limit Lb. Per Sq. In.	Tensile Strength Lb. Per Sq. In.	Elong. Per Cent in 8 In.	Effic. Per Cent
¼	40,930	54,650	04.50	97.6
⅜	44,930	53,020	05.75	94.7
½	40,160	51,280	04.75	91.6

The elongation in the welded material was less, of course, than in the original stock because it is less fibrous, but its ductility could be improved by hammering after welding and this is frequently done with heavy sections like side frames, steel castings, etc.

W. F. SCHAPHORST.
45 Academy Street, Newark, N. J.

The Iron Age and Its Readers

In the light of the repeated promise of large expansion in iron and steel making on the Atlantic Coast, the account in last week's issue of the new blast furnaces and ore concentrating plant of the Replogle Steel Co. at Wharton, N. J., marks a definite development. As related to the continued growth of the industry in the East, the article is illuminating in respect to the economics of the situation.

The quick and comprehensive reporting of an important engineering meeting is exemplified in the case of the Cardiff, South Wales, sessions of the Iron and Steel Institute, concluded Sept. 24 and reviewed for THE IRON AGE readers 13 days later. In the six pages required for the account, the noteworthy features were the papers and discussions on the dry blast for iron furnaces and the electrostatic cleaning of gas, the latter accompanied by illustrations.

Numerous articles on labor questions, always a feature of THE IRON AGE, threw light last week on the increasing efficiency of labor.

The full-page map of the Gary works of the United States Steel Corporation, printed in the issue of Sept. 16 and outlining the war-time additions to the original works and those now under construction, will be reprinted on a sheet suitable for framing or for use on the glass topped desk, provided the number requesting the map is sufficiently large to warrant the reprinting.

Iron and Steel Markets

IRREGULARITY IN PRICES

Chiefly in Resales and in Selling by Small Producers

Steel Ingot Production Stationary—Wide Variation in the Pig Iron Market

The expectation of lower prices still controls the steel market, but the readjustment is slow-paced, irregular and confused. This week signs of changed conditions have appeared in wire products, tin plate and some other lines which previously had escaped the effects of the business reaction.

Buyers of nails who have readily paid independent makers' prices are now holding off and some cancellations are reported. The weaker tendency in tin plate comes with the passing of demand from makers of perishable food containers. Strip steel is lower, recent sales being at $10 per ton under the recent basis. Automobile manufacturers, who are large consumers, are pressing for a revision of contracts. Plate mills with idle capacity are seeking business in strip widths. Some bar mill capacity has turned to rolling bands on which as low as 4.50c., Pittsburgh, has been named, as against 5.50c. as the recent peak.

Naturally, smaller producers figure in transactions showing the greatest departure from mid-summer prices. The largest independent producers, with three months' business on their books, are generally maintaining their position.

The fact that consumers can now get some forms of material readily checks their desire to buy and specifications are being held up in a good many cases.

Sheet manufacturers have refused the urgings of motor car companies to revise their contracts, but are having to find a market for their surplus at concessions. Detroit reports point to rather better operation of some automobile plants.

The extreme price on steel bars may now be put at 3.50c., and there seems no question that a large attractive lot could be placed at 3.25c. In plain structural material there seems to be no range in independent prices, the quotations being either 2.45c., placed with the Steel Corporation, or 3.10c., placed with an independent maker. On mill shipments of steel plates 3.50c. is still named, but 3.25c. is generally the maximum. High-speed steel has settled to $1.10 per pound in transactions of any size.

In the Chicago district the unevenness of the situation is illustrated on the one hand by an increase from a 55 per cent to an 80 per cent operation by the Wisconsin Steel Works and on the other hand by the closing down of a structural and a plate mill of the Inland Steel Co. and a number of open-hearth furnaces, bringing steel ingot production down to a 65 per cent basis.

It is plain that railroad difficulties will be long drawn out. The restriction of coal cars to coal traffic except for shipments in the direction of coal mines again becomes effective Oct. 15. On the side of better movement is a 35 per cent reduction in the past week in the American Sheet & Tin Plate Co.'s accumulated stocks.

Steel ingot production in September was substantially the same as in August—2,999,551 tons by 30 companies, which made 85 per cent of the total in 1919, as against 3,000,432 tons in August. For the entire country the September output was thus about 3,524,000 tons, or at a yearly rate of over 42,000,000 tons.

Semi-finished steel, with only sporadic demand, shows irregular prices. A sale of 5000 tons of sheet bars has been made at $60 at Canton, Ohio. Rerolling billets have sold at $50, Pittsburgh, yet other sellers are holding to $60. Forging billets have sold at $64.

The reselling of pig iron has increased to such an extent as to dominate the market in leading centers, with almost no buying from furnaces. At Chicago Southern iron has been resold by foundries at $4.50 below the furnace price, $42, Birmingham, and Northern iron at $4 lower than the furnace price. In basic iron, $43, Valley, or $5.50 below the regular quotation of two weeks ago has been named and a Cumberland, Md., melter is credited with buying 2000 tons at even a lower price. In the Buffalo market resale malleable is quoted at $46.25, while another furnace sale has been reported at $47, or 50c. lower than the recent transaction which recorded a sharp decline in that market. Requests for cancellations continue to come in, but furnaces are taking a firm stand against granting them. On the whole, the pig iron market is in a ragged condition, with a tendency toward lower prices.

Some blast furnaces may stop in the event of lower pig iron prices with no accompanying decline in coke. The persistently high market for coke, $17 to $18 being paid on spot shipments, makes a serious problem for merchant blast furnaces.

Practically 1,000,000 tons more ore is piled on Lake Erie docks than was there at this time a year ago. The deliveries to the docks to Oct. 1 amounted to 31,959,201 tons, or 5,570,000 tons more than for the same period in 1919, and shipments to inland furnaces for the same period were 23,222,770 tons this year, or 2,500,000 tons more than last year.

Pittsburgh

PITTSBURGH, Oct. 12.

The price adjustment in iron and steel, which has been going on for several weeks, has gained both in momentum and scope since a week ago. It no longer is confined to those products entering into the manufacture of automobiles and to the heavier lines, but now is being felt in wire products, tin plate and some of the other lines which hitherto have appeared to escape the effect of the reaction in business. So far there has been no decline in independent prices of either nails or wire, the change in the situation being manifest in a tendency on the part of buyers to haggle over prices and to be indifferent about getting on the books of manufacturers unless given assurance of early deliv-

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Oct. 12, 1920	Oct. 5, 1920	Sept. 14, 1920	Oct. 14, 1919
No. 2 X, Philadelphia‡	$53.51	$53.51	$53.51	$32.10
No. 2, Valley furnace†‡	47.00	47.00	50.00	26.75
No. 2 Southern, Cin'ti†	46.50	46.50	46.50	31.60
No. 2 Birmingham, Ala.†	42.00	42.00	42.00	28.00
No. 2 foundry, Chicago*	46.00	46.00	46.00	26.75
Basic, del'd, eastern Pa.	51.26	51.26	51.26	28.00
Basic, Valley furnace	46.00	46.00	48.50	25.75
Bessemer, Pittsburgh	50.46	50.46	50.46	29.35
Malleable, Chicago*	46.50	46.50	46.50	27.25
Malleable, Valley	50.00	50.00	50.00	27.25
Gray forge, Pittsburgh	47.96	47.96	50.96	27.15
L. S. charcoal, Chicago	58.50	58.50	58.50	32.75

Rails, Billets, etc. Per Gross Ton:				
Bess. rails, heavy, at mill	$55.00	$55.00	$55.00	$45.00
O.-h. rails, heavy, at mill	57.00	57.00	57.00	47.00
Bess. billets, Pittsburgh	55.00	55.00	60.00	38.50
O.-h. billets, Pittsburgh	55.00	55.00	60.00	38.50
O.-h. sheet bars, P'gh.	62.50	65.00	67.50	42.00
Forging billets, base, P'gh.	70.00	70.00	75.00	51.00
O.-h. billets, Phila.	60.74	60.74	65.74	42.50
Wire rods, Pittsburgh	75.00	75.00	75.00	52.00

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	4.85	4.85	4.85	2.745
Iron bars, Pittsburgh	4.75	4.75	4.75	2.75
Iron bars, Chicago	3.75	3.75	3.75	2.62
Steel bars, Pittsburgh	3.25	3.25	3.25	2.35
Steel bars, New York	3.63	4.13	4.13	2.62
Tank plates, Pittsburgh	3.25	3.25	3.25	2.65
Tank plates, New York	3.63	3.63	3.63	2.92
Beams, etc., Pittsburgh	3.10	3.10	3.10	2.45
Beams, etc., New York	3.48	3.48	3.48	2.72
Skelp, grooved steel, P'gh.	3.25	3.25	3.25	2.45
Skelp, sheared steel, P'gh.	3.50	3.50	3.50	2.65
Steel hoops, Pittsburgh	5.00	5.50	5.50	3.05

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Oct. 12, 1920 Cents	Oct. 5, 1920 Cents	Sept. 14, 1920 Cents	Oct. 14, 1919 Cents
Sheets, black, No. 28, P'gh.	6.75	6.75	7.50	4.35
Sheets, galv., No. 28, P'gh.	8.25	8.25	9.00	5.70
Sheets, blue an'l'd, 9 & 10.	5.00	5.00	5.50	3.55
Wire nails, Pittsburgh	4.25	4.25	4.25	3.25
Plain wire, P'gh.	3.75	3.75	3.75	3.00
Barbed wire, galv., P'gh.	4.45	4.45	4.45	4.10
Tin plate, 100-lb. box, P'gh.	$8.50	$9.00	$9.00	$7.00

Old Material, Per Gross Ton:				
Carwheels, Chicago	$36.00	$37.00	$37.00	$24.00
Carwheels, Philadelphia	41.00	41.00	43.00	24.50
Heavy steel scrap, P'gh.	28.00	28.00	28.50	19.00
Heavy steel scrap, Phila.	23.00	23.00	26.50	19.00
Heavy stel scrap, Ch'go	22.00	22.50	24.50	17.50
No. 1 cast, Pittsburgh	40.00	41.00	42.00	24.00
No. 1 cast, Philadelphia	39.00	39.00	40.00	25.00
No. 1 cast, Ch'go (net ton)	29.00	30.00	34.50	23.50
No. 1 RR. wrot, Phila.	31.00	31.00	34.00	27.00
No. 1 RR. wrot, Ch'go (net)	20.00	21.00	24.00	18.00

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$17.00	$17.00	$16.50	$4.25
Furnace coke, future	14.00	14.00	14.00	4.75
Foundry coke, prompt	18.00	18.00	17.50	6.00
Foundry coke, future	14.00	14.00	14.00	5.75

Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	17.50	18.25	18.75	22.62½
Electrolytic copper, N. Y.	17.50	18.25	18.75	22.12½
Zinc, St. Louis	7.37½	7.50	7.80	7.40
Zinc, New York	7.50	7.65	7.80	7.75
Lead, St. Louis	7.37½	7.50	8.25	6.00
Lead, New York	7.50	7.50	8.37½	6.25
Tin, New York	41.50	42.50	45.00	55.50
Antimony (Asiatic), N. Y.	7.00	7.00	7.12½	8.50

The prices in the above list are for domestic delivery and do not necessarily apply to export business.

eries. Hitherto, particularly with regard to nails, buyers have been so eager to get a place on the books of makers that they have readily paid the independent prices and in some instances have been indifferent as to prices, so long as they got their orders in. Now, they do not want to be committed too far ahead at to-day's prices. A report has it that a large wire company has had rather big cancellations both from the automobile manufacturers and from the hardware trade.

A weaker tendency which is beginning to develop in tin plate may be ascribed to the fact that with the passing of the demand from makers of perishable food containers, other consumers are assured of larger supplies against their contracts and consequently they no longer are pressing for supplies. The market for steel strips is distinctly weaker than it has been with sales noted at a recession of $10 per ton from the recent price basis. Some of the automobile manufacturers who have announced price cuts in their cars are exerting considerable pressure on strip steel manufacturers for downward revision in contracts carrying high prices. The automobile industry is such a big factor in the consumption of strip steel that it is more than likely that its efforts to secure a reduction will succeed. Furthermore, some of the manufacturers with idle plate-making capacity have lately been seeking business in No. 12 and No. 13 gage steel in strip widths. Some bar mill capacity is being employed in rolling bands, and it is currently reported that a price of 4.50c. base, Pittsburgh, has been named against this product, or $20 per ton below what has hitherto been regarded as the independent price.

Although independent makers of sheets are disinclined to revise prices downward in contracts with the automobile manufacturers and to insist that the latter live up to their obligations, it cannot be said that the sheet market is any stronger than it has been. In fact, those makers whose business was largely with the automobile industry have had such large tonnages held up by the decline in that industry that they now are actively seeking business in other finishes. As an evidence of how contrary the demand is, it can be stated that now that the supplies are available buyers are not falling over one another to secure them.

The outstanding features in the market for semi-finished steel is a sale of 5000 tons of sheet bars to an eastern Ohio sheet maker at $60 f.o.b. Canton, Ohio. No further decline is observed in pig iron prices, but this is because there has been no business to test the market.

Threats of suspension of operation of blast furnaces are heard in the event that lower pig iron prices are not accompanied by a drop in the coke market. No easing is observed in the fuel situation, with the railroads said to be paying $9 per ton at mine for steam coal and still higher prices ruling for by-product and gas grade, while the coke market appears to be in the hands of a few interests and they seem inclined to exact the last penny from those who must have supplies.

The scrap market remains exceedingly dull and with the only buying coming from dealers against short sales, the price tendency is downward. Transportation conditions leave little to be desired.

The National Tube Co., which for weeks was adding to its piled up stocks, now is shipping its current production and is operating full at practically all of its plants. Another striking illustration of the improvement in car supplies and transportation conditions is the fact that the American Sheet & Tin Plate Co. has been able in the past week to reduce its accumu-

lated stocks by about 35 per cent. The Carnegie Steel Co. has turned on the blast in three furnaces which were banked a week ago, now having 39 active stacks. It is maintaining about 80 per cent operations in its steel works.

Pig Iron.—As far as actual sales are concerned the past week has been the quietest through which the trade has gone since the reaction of buying set in several weeks ago. It cannot be denied that the undertone of the market is weak and yet it is impossible to make any change in prices owing to the lack of sales of sufficient importance upon which to hang new quotations. A local melter of Bessemer iron has resold about 200 tons of a lot of 1000 tons of Valley iron of this grade, bought a few weeks ago at $47, furnace, at $46. The N. & G. Taylor Co., Cumberland, Md., is credited with having purchased 2000 tons of basic iron at $45.66 delivered. Both confirmation and details are lacking, but the belief exists that the iron came from a Pittsburgh district steel company. The price reported paid would be equal to $42.58, Valley furnace, the freight rate from the Valley to Cumberland being $3.08. Nothing recently has been done in malleable, gray forge, foundry or low phosphorous grades. This is not hard to understand in view of the fact that melters generally are getting ample supplies against contracts, and a number of them are asking for deferred shipments. A large steel foundry interest having contract with a Valley furnace for basic is holding up shipments, as is also an eastern Ohio sheet maker who has suffered a serious curtailment of business as a result of the slump in the automobile industry. Prices in all grades are purely nominal and there is probably a wide difference between what is quoted and what makers would accept against attractive orders.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being $1.96 per gross ton:

Basic	$46.00
Bessemer	48.50
Gray forge	46.00
No. 2 foundry	47.00
No. 3 foundry	46.50
Malleable	50.00

Ferroalloys.—Hardly enough is going on in ferroalloys in this market to give any basis to prices. While both domestic and English makers of ferromanganese still are quoting $170, seaboard, for 76 to 80 per cent material, no sales lately have been at that figure. More or less resale tonnage is coming upon the market and it is understood to be available at anywhere from $150 to $165. It cannot be said that domestic producers are pressing sales at the moment, probably because they are waiting to see whether the strike of the English coal miners and the paralysis of English industry will eventuate. If there is no strike, it is difficult to figure how prices can be maintained in view of the fact that consumers generally are extremely well covered by contracts, and because of the free deliveries of English material over the past few months, not a few are oversupplied. The market for spiegeleisen also is intensely dull and quotations of makers have only slight relation with what might possibly be done if any business were coming out. Quotations of the two leading producers range from $80 to $82.50 furnace, for material of average 20 per cent manganese content, but $80 is as high as any business has been done and even that price probably will be shaded against attractive tonnages. It is so long since any business has been done in 50 per cent ferrosilicon that the prices are even more indefinite in this material than they are in others.

We quote 76 to 80 per cent domestic ferromanganese $160 to $175, delivered Pittsburgh, for either prompt or deferred shipment; English, $165 to $170, seaboard. We quote average 20 per cent spiegeleisen at $80, furnace and 50 per cent ferrosilicon at $75 to $80, furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson County and New Straitsville, Ohio, furnaces as follows: 9 per cent, $66; 10 per cent, $69.50; 11 per cent, $72.80; 12 per cent, $76.10. Silvery iron, 6 per cent, $56.50; 7 per cent, $58; 8 per cent, $60; 9 per cent, $62; 10 per cent, $64.50; 11 per cent, $67.80; 12 per cent, $69.80. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is $4.06 per gross ton.

Billets and Sheet Bars.—Recent inquiry of the Newton Steel Co., Newton Falls, Ohio, for 5000 tons of sheet bars has been covered by a Canton maker at $60 mill. This constitutes the most important business recently done in semi-finished steel and it also establishes a new low record independent mill quotation for the present swing of prices. Bids against this inquiry are reported to have ranged as high as $70 and it is understood that less than $60 mill was named by one maker who, however, was at a freight disadvantage with the successful bidder. Although some makers of sheet bars still are asking $70, there really is no basis in sales for a higher quotation than $65, and some of the integrated sheet manufacturers, who have had a good deal of business held up by the slump in the automobile industry, probably would not pass up attractive tonnages at $60. The billet market continues inactive with most independent makers asking $60 for ordinary soft steel 4 x 4 in. rerolling billets, but they are not inclined to reject summarily attractive tonnages carrying a lower price. Some makers are said to be waiving the differential on rerolling billets of less than 4-in.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at $38.50 to $60; 2 x 2-in. billets, $42 to $63.50; Bessemer sheet bars, $42 to $65; open-hearth sheet bars, $42 to $65, and forging billets, ordinary carbons, $70 to $75 base, all f.o.b. Youngstown or Pittsburgh mill.

Wire Rods.—No special change is noted in prices but the market plainly is less of a sellers' affair than it was a short time ago. While sales of Bessemer screw stock rods still are being made up to $80, the top of the market on ordinary soft rods is $75. These prices represent a decline of about $5 per ton from the prices which were being done prior to the reaction in buying which set in very strongly a few weeks ago. A few cancellations have come to makers and there have been some suspensions of shipments which have made the supply situation somewhat easier. One maker here who recently had a suspended order against 500 tons, had the tonnage released a few days later. Prices are given on page 1015.

Plates.—A price of more than 3.25c. finds no basis in sales and even that price is not readily obtained except on comparatively small tonnages. Independent company bookings are not particularly extensive, and those who have mills on which the lighter gages can be rolled are seeking business in blue annealed sheets and strip steel. Two companies are quoting 3.50c., but both admit losing business at that price.

We quote sheared plates of tank quality, ¼ in. and heavier for early delivery from independent mills at 3.25c. Pittsburgh. The Carnegie Steel Co. still quotes 2.65c. and is accepting business at that figure, but is not guaranteeing early delivery.

Structural Material.—The market for steel for structural purposes still is extremely inactive and the tendency of prices of independent makers is toward lower levels. The Bethlehem Steel Co. is quoting Grey mill sections at 3.25c., Pittsburgh, but its base on ordinary structural shapes is 3.15c. The Cambria Steel Co. is on a base of 3.25c., Pittsburgh, for shapes, but 3.10c. is the base of the leading Pittsburgh independent and that price measures the top on any business done recently. In fact, there have been reports of 3c. having been done shapes, but this has not been confirmed. The general price of sheared plates from independent mills is 3.25c., Pittsburgh, but little tonnage is moving at that figure, let alone at 3.50c., which still is being quoted by one maker. On angle bars the market hardly is quotable at higher than 3.25c. Structural awards with shops in this district continues few and small. The Memphis Steel Construction Co. recently received 400 tons for tank work from the Transcontinental Oil Co., while the McClintic-Marshall Co. has taken 100 tons for an extension to the plant of the Railway Steel Spring Co., Chicago Heights, and the Jones & Laughlin Steel Co. has taken 150 tons for a garage and repair shop for the J. W. Butler Co., McKeesport, Pa.

Wire Products.—While some cancellations and suspensions are coming to some of the independent manufacturers in this district and include even nails, they are too small to have any important bearing on the situation. Requests for suspensions are being refused

by some makers, who are applying the released tonnages against other obligations. Though demand in practically all of the common wire products still is strong, it is significant that a large independent company, which hitherto has been turning down practically all new business, now is considering the making of reservations of the requirements of its regular customers for the first quarter of 1921. Pittsburgh jobbers are able to get only a few nails, but distributors in other centers are profiting by the fact that shipments are larger than they have been, due to a better supply of box cars. It is admitted that the situation in wire, sentimentally, if not actually, is slightly weaker than it has been. The slump in the automobile industry brought a good many cancellations from the makers of automobile cushions, but it is said that the tonnages released have been pretty well taken by other users.

We quote wire nails at $3.25 base, as the price of the American Steel & Wire Co., and $4.25 to $4.50 by independent mills. We quote bright basic wire at $3.25, the price of the American Steel & Wire Co. and $3.75 to $4, the price range of the independent mills.

Tin Plate—The market not only is much quieter than it has been, but also appears to be developing a slightly weaker tendency as far as independent prices are concerned. Better deliveries are being made against old orders in general line tin plate than was the case a few weeks ago, and this development has practically stopped the demand for spot tonnages from makers of oil, paint, varnish and other kinds of cans, which made possible the high prices recently obtainable. Asking prices of independent makers against production plate range from $8.50 to $9, per base box, but no recent business for domestic account has been done at either price and $7.50 was as high as a buyer recently in the market would pay for a round tonnage. Little business lately has been done in stock items at higher than $9, although some makers still are asking more. The American Sheet & Tin Plate Co. has shipped practically all of the accumulations of the period when the railroads were paralyzed by labor troubles. Independent companies also have been making very much larger shipments. The reaction in buying of tin plate for container purposes has not extended to terne plate, which remains in good request.

We now quote tin plate to domestic consumers for remainder of the year delivery at $7 to $9 base box; stock items $9 to $10, and for export $11 to $12 per base box, all f.o.b. Pittsburgh.

Steel Rails—Nothing yet has developed of a definite character relative to the probable prices to be charged the railroads for 1921 tonnages of standard sections. Estimates of the business placed and under reservation run generally around 1,000,000 tons. Fair demand still is noted for light rails, but sales at higher than 3.25c., mill, are much fewer than they were recently.

The Carnegie Steel Co. is still quoting the March 21, 1919, prices, these being 2.45c. for 25 to 45-lb. sections, 2.49½c. for 16-lb. and 20-lb. sections, 2.54c. for 12-lb. and 14-lb. sections, and 2.58½c. for 8-lb. and 10-lb. sections. This company is also quoting standard sections 50 lb. and heavier at $45 for Bessemer and $47 for open hearth stock. The Cambria Steel Co. is quoting 25-lb. to 45-lb sections at 3.75c., 16-lb. and 20-lb. sections, 3.79½c., 12-lb. 3.84c., at mill, for such delivery as it can make. The Jones & Laughlin Steel Co. is quoting light rails at 3.25c. for 25 to 45-lb. sections.

Nuts, Bolts and Rivets.—Basis exists for double quotations for the reason that several makers have not followed the advance announced by Eastern producers about the end of August and considerably more tonnage is moving at the old list than the new one. The higher prices refer entirely to orders for prompt delivery and such demands are hardly as heavy as they were recently, as deliveries against contracts are better as result of improved shipping conditions and the fact that makers are getting production up with larger supplies of raw material. All makers are well booked for the remainder of the year, but some who figured they would have no tonnage available for last quarter shipment now believe they will be able to take on some business for that period. The shortage of small bolts still is rather acute as shipments of drawn wire still are backward. Prices and discounts are given on page 1015.

Iron and Steel Pipe.—The National Tube Co. finally has succeeded in getting its shipments up to production, and while it has not made any cut in its accumulated stocks, at least it has not added to them in the past week. In view of the fact that this company has been piling more pipe than it has been shipping, for several weeks, it is patent that jobbers supplied by it must be somewhat better off in the matter of supplies than they have been. Independent companies have been having better success than the leading interests in the matter of shipments. The demand for pipe, both lap weld and butt weld, still is large, but buying is of a more moderate character than it has been and premium business has disappeared. It is reported that the Interstate Commerce Commission extended order No. 107, allotting 60 cars daily for the shipment of oil country pipe to the West and Southwest, which expired Oct. 11. Prices and discounts are given on page 1017.

Spikes.—Orders in both large and small spikes are rather few, but makers have sufficient business in sight to be indifferent about new orders and recent prices are firmly held. Prices are given on page 1017.

Iron and Steel Bars.—The independent market in merchant steel bars has settled to 3.25c. with most makers. One company continues to quote 4c. base, but this figure finds no basis in sales, even for prompt delivery. Prices of concrete reinforcing bars are maintained with difficulty, owing to the extremely limited demand. Iron bars are held at recent prices, but the market is considerably quieter in this direction than it has been.

We quote steel bars rolled from billets at 2.35c., this being the price of the Carnegie Steel Co. for very indefinite delivery, likely not before first quarter of next year. Other mills rolling steel bars from billets quote from 3c. to 3.50c. at mill, prices depending entirely on the buyer and the delivery wanted. We quote reinforcing bars, when rolled from billets, at 3.75c. to 4c., and from old steel rails at about 3.50c. at mill. We quote common iron bars at 4.75c. and refined iron bars at 5c. to 5.50c. in carloads, f.o.b. mill, Pittsburgh.

Sheets.—Makers of automobiles who have announced price reductions, notably the Ford Motor Co., are exerting considerable pressure upon independent makers to secure price reductions, but this effort generally is not succeeding. So much tonnage, however, has been suspended as a result of the slump in the automobile industry, that it is comparatively easy for users of other finishes to secure tonnages and get them promptly. Not only has the supply situation been eased by the drop in the automobile specifications, but with the sheet mills averaging about 80 per cent operation and transportation conditions improving, deliveries against old orders have increased considerably. Some makers are quoting one pass black sheets at as high as 7.25c., base; galvanized at 8.50c., and blue annealed at 6c., but sales at these prices are small and refer to tonnages for delivery in one to three weeks. Tin mill black sheets still are scarce and firm in price. Prices are given on page 1017.

Hoops and Bands.—The independent market is wavering, and no new purchases have commanded as much as 5.50c., base. Some idle bar mill capacity is being employed on bands, and concessions running up to $20 per ton from the recent independent maximum are said to have been offered by some makers anxious for business. The Steel Corporation has made no change, still quoting and accepting business at 3.05c. base.

Hot-Rolled and Cold-Rolled Strips.—The market now is feeling the full weight of the decline in the automotive industry, and what has long been regarded as minimum prices have lately been shaded to the extent of about $10 per ton. Sales of cold-rolled strips have been done at 8c., and in hot-rolled at 5c., base. Instead of an advance to 6c. for hot-rolled and 9c. for cold-rolled strips, as was predicted a couple of months ago, a revision downward to 5c. and 8c., respectively, now appears imminent. Where automobile interests have restored suspended tonnages it has usually been with a proviso for very much extended deliveries. The American Steel & Wire Co. is quoting cold-rolled strips at 6.25c., base.

Cold-Finished Steel Bars.—The American Steel & Wire Co., which, although out of the market for several months, did not withdraw its quotation of 3.60c. base, Pittsburgh, for cold-finished steel bars, has announced an advance of 4c. base, and the assumption is that this means that it again is in the market for business. No trouble is now being experienced by buyers in securing tonnages at 4.25c base, for early delivery and one large producer still is quoting 4.10c. Some makers working on high-cost hot-rolled bars are seeking more, but are not getting much business except by meeting the price established by competition.

Old Material.—Demand remains at a low ebb and indifference on the part of melters about supplies is even more marked now than it was a week ago. Railroads now are granting permits for the shipment of scrap to the extent of about 50 per cent of the number asked for; a week ago they were not honoring more than 25 per cent of such requests. This development is helping the supply position of consumers and adds to the conservatism created by the reaction in business, which affects both the steel works and the foundries. Of the latter, gray iron foundries are suffering less than the steel foundries. Demand for the foundry grades of scrap also is affected by the fact that the movement of pig iron to them on old orders has been on a heavy scale in the past month or so. Current trading is almost entirely between dealers and prices ruling in such deals are well below what melters probably would be asked. Reports that the Steel Corporation was planning heavy purchases find no confirmation, but the impression prevails that further big buying will develop from this source because of the loss in production of pig iron imposed by the fuel shortage and the possibility of a further loss through insufficient supplies of ore.

We quote for delivery to consumers' mills in the Pittsburgh and other districts that take Pittsburgh freight rates as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh, deliv.	$28.00 to $28.50
No. 1 cast (for cupola)	40.00 to 41.00
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Franklin, Pa., and Pittsburgh	39.00 to 40.00
Compressed sheet steel	23.00 to 23.50
Bundled sheet sides and ends, f.o.b. consumers' mills, Pittsburgh, dist.	17.00 to 17.50
Railroad knuckles and couplers	29.50 to 30.00
Railroad coil and leaf springs	29.50 to 30.00
Railroad grate bars	29.50 to 30.00
Low phosphorus melting stock (bloom and billet ends, heavy plates, ¼ in. and heavier	33.00 to 34.00
Railroad malleable	34.00 to 35.00
Iron car axles	55.00 to 56.00
Locomotive axles, steel	46.00 to 47.00
Cast iron wheels	42.00 to 43.00
Steel car axles	42.00 to 43.00
Rolled steel wheels	29.50 to 30.00
Machine shop turnings	16.00 to 16.50
Sheet bar crop ends (at origin)	30.00 to 31.00
Heavy steel axle turnings	23.00 to 24.00
Short shoveling turnings	18.50 to 19.00
Heavy breakable cast	35.00 to 36.00
Stove plate	29.00 to 30.00
Cast iron borings	19.00 to 19.50
No. 1 railroad wrought	32.00 to 33.00

Coke.—Although sales of spot beehive oven furnace coke are reported to have been made as high as $17.75 per net ton oven, business at that figure hardly is representative of the market, as the buyer paid that price for a selection of certain brands and grades. The producers' market is quotable from $17 to $17.50, and standard coke has been offered even to middlemen at the latter price. In view of the easier tendency in the pig iron market, the continued firmness of the coke market occasions some surprise, especially as production has improved somewhat in the past week, as a result of a better car supply. The explanation probably is to be found in the fact that bulk of the free supply is in a few hands and those who are dependent upon spot offerings find it rather difficult to cover their needs elsewhere. The demand is not big, broad or active, but at the moment slightly exceeds the supply, and this condition constitutes the thin thread from which the market is suspended. Nothing is being done in contracts for 1921, for the price ideas of producers are governed by the spot prices of to-day, which are considerably above those of the pig iron producers, who have almost no business on their books for 1921, and who moreover see immediately ahead, a considerable recession in iron prices. Spot foundry coke still is selling at $18 generally, with $18.25 and $18.50 occasionally being obtained for choice brands.

Meeting of Society of Industrial Engineers

The Society of Industrial Engineers will hold its semi-annual convention at Pittsburgh on Nov. 10, 11 and 12, at the Carnegie Music Hall. The following list of titles of some of the papers to be presented is announced:

The need for industrial education; how to train engineers in industry; method of training time study men; college training for industrial engineers; making industrial engineers out of business men; training managers to apply business principles; analyzing industrial educational requirements; training workmen; training foremen; training the office force; training the employment manager; need for the application of industrial engineering principles in National affairs; part of psychology and psychiatry in industry; industrial physician as an educational influence; training understudies for the general manager; and European industrial conditions.

Afternoon and evening sessions will be held on each of the three days, the mornings being devoted to visits to some of the large plants in and near Pittsburgh. In the foyer of the Carnegie Music Hall will be located an exhibition of modern factory equipment, office appliances, charts, production control boards, photographs, etc. The official program containing a list of the speakers and their topics will be ready for distribution about Oct. 9; copies may be obtained from the office of the Society of Industrial Engineers, 327 South LaSalle Street, Chicago.

Ford Company Urges Revision of Contracts

DETROIT, Oct. 11.—The Ford Motor Co. late last week had several of the independent sheet manufacturers in conference in this city and they were told that as the Ford company had marked down the price of its cars, they ought to reduce the price of steel in their contracts. It is understood that at a meeting of the sheet makers they decided to refuse the Ford request and will insist that that company live up to its contract obligations.

Several Ford Motor Co. agents were in Pittsburgh recently and brought pressure to bear for a revision downward of contract prices.

Fixed Prices for Coal

The Indiana special coal and food commission recently appointed has fixed prices operators shall charge for coal, which run from $2.80 to $5.85 a ton at the mines, according to kind of coal and location of the mines. The basic price is on mine run; screenings 20c. less and prepared sizes 25c. a ton more. Jobbers, wholesalers' and retailers' margins of profit are also to be fixed. The prospect is that jobbers will be allowed 15c. a ton. Retailers told the commission they have been operating on a margin of $3 a ton above mine prices and they expect the commission to fix that rate.

New Production Records

Eight new production records were established in the open-hearth department of the Edgar Thomson works of the Carnegie Steel Co. last week. Total open-hearth production for the week exceeded by 3000 tons the best previous record, while the best daily record also was broken. Four open-hearth furnaces made new high records in the matter of weekly production and two furnaces established new daily records.

New York

NEW YORK, Oct. 12.

Pig Iron.—Representatives of furnaces are resisting efforts of foundrymen to cancel when in the judgment of the former there is no justification for such action. Sellers say that they made deliveries of low-priced iron sold on contract and could easily have sold to other buyers the tonnages which it is now sought to cancel, and they do not intend to grant the requests for cancellation. In some cases, requests for cancellation have been withdrawn after the sellers have presented their argument. Foundry iron can be obtained at Buffalo on resale at as low as $45 base, but as high as $50 is still being asked by the furnaces. Eastern Pennsylvania furnaces have not yet quoted lower than $50, furnace, for No. 2 foundry, and some are quoting $51. The market is extremely dull, foundries buying only small lots for filling in purposes.

We quote for delivery in the New York district as follows, adding to furnace prices $2.52 freight from Eastern Pennsylvania, $5.46 from Buffalo and $6.16 from Virginia.

East. Pa., No. 1 fdy., sil. 2.75 to 3.25	$55.52
East Pa., No. 2X, fdy., sil. 2.25 to 2.75	53.77
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	52.52
Buffalo, sil. 1.75 to 2.25	54.46
No. 2 Virginia, sil. 1.75 to 2.25	54.16

Ferroalloys.—The market for ferromanganese continues stagnant and is entirely devoid of inquiry or sales. Prices are nominal on a basis of $170, seaboard, for both the foreign and domestic product. It is believed that at least resale alloy could be obtained as low as $160. Domestic production continues heavy, having been 27,686 tons in September, according to blast furnace reports of THE IRON AGE. The spiegeleisen market is also inactive, although 100 tons has been sold for domestic consumption for early delivery at the full price of $82.50, furnace, and two tons sold for export. The production in September was heavy at 11,860 tons, or one of the largest months of the year. A sale of 2000 tons of Indian ore for early shipment is reported at around 55c. per unit, seaboard, this being the first sale at this level for some months. Previous sales have averaged around 65c. per unit. Ferrosilicon, 50 per cent, is unchanged, and in quiet demand at $80 to $85, delivered.

Finished Iron and Steel.—Business is flat, both in domestic and export lines. The rapid adverse movement in exchange rates with South America has killed new exports to the field which has been latterly the chief support of foreign business, and the moratorium which has been declared in Cuba is causing some concern over sizable lots of business not yet settled. One definite export transaction was for the Dutch East Indies, the one bright spot for some time in export trade, this covering about 650 tons of flats on which 3.75c., Pittsburgh base, was done. A matter of 700 tons of plates is under consideration for export, and 3.20c., Pittsburgh, has been named on this. The extreme price on steel bars may now be put at 3.50c., and there seems no question but that a large attractive lot could be placed at 3.25c. In plain structural material there seems to be no range in prices, the quotations being either 2.45c. placed with the Steel Corporation, or 3.10c., placed with an independent maker. On mill shipments of steel plates 3.50c. is still named, but there is a range with 3.25c. substantially the maximum. As regards furture price tendencies, sellers will apparently not be surprised at a further recession, but as a result of their canvassing of the situation they are unanimous that an active market will develop at the turn of the year. A large amount of apartment house building is expected just as soon as the financial community changes its viewpoint, and the steel tonnage thus represented will of course be added to the admittedly large amount needed by the railroads. The largest structural letting of the week is 2200 tons for the Plaza Hotel addition, awarded to the Hay Foundry & Iron Works. For a housing station for the street cleaning department in Brooklyn, 300 tons has been closed, and the American Bridge Co. will supply 1200 tons for caissons for the Interstate tunnel under the Hudson River. Among new projects may be mentioned an addition to the New York Telephone Co., 146th Street and Convent Avenue, 900 tons, and a Masonic Temple at Danville, Va., 500 tons. No car business has come to light, but the American Locomotive Co. has booked 50 100-ton locomotives the Paris-Orleans railroad, France.

We quote for mill shipments, New York, as follows: Soft steel bars, 2.73c. to 3.88c.; plates, 3.03c. to 3.88c., the minimum prices being for indefinite delivery and the highest prices for delivery in a few weeks; shapes, 2.83c. when purchased from the United States Steel Corporation and 3.48c. when purchased from other producers; bar iron, flats, wider than 6 in., 5.38c., with half extras; light rounds, squares and flats, 5.88c. with full extras, and other sizes, 4.88c., with half extras.

Warehouse Business.—Warehouses note no decrease in the number of orders received, but most orders are for about half the usual quantity. Shipments from mills are good, a few sizes being received that have been out of stock for some time. Waverly warehouse of the Carnegie Steel Co. shows an improvement in some sizes that have been difficult to obtain. No change in prices has been made by warehouses carrying brass and copper, but the prevailing quotations will probably be altered soon. We quote prices on page 1030.

High Speed Steel.—The market is unchanged. Buying is light, but domestic producers still quote $1.25 per lb., New York, for 18 per cent tungsten high-speed steel, with contracts made at lower prices.

Cast-Iron Pipe.—Better transportation and the influx of raw material are the more favorable features in the trade, but the lack of labor grows more acute. Some manufacturers are securing higher prices than we quote because of the heavy demand. We quote f.o.b. New York, 6-in. and larger, $77.22; 4-in., $87.22; 3-in., $97.22, with $2 additional for Class A and gas pipe.

Old Material.—Another decided drop has taken place, particularly in railroad material, which has declined from $1 to $5. Brokers generally attribute the lack of buying by consumers to the coming election and its tendency to place business at a standstill. Then, too, purchasing agents are doubtless waiting until they can sound the bottom of the present downward movement before placing large orders. The best obtainable price of heavy melting steel for Pittsburgh delivery is $27, and $23.50 for eastern Pennsylvania. Steel car axles have suffered the greatest decline, one New York broker having bought some for $27, which is $12 under the market price of a few days ago.

Buying prices per gross ton, New York, follow:

Heavy melting steel	$19.00 to $20.00
Rerolling rails	32.00 to 33.00
Relaying rails, nominal	55.00 to 56.00
Steel car axles	30.00 to 32.00
Iron car axles	44.00 to 45.00
No. 1 railroad wrought	24.00 to 26.00
Wrought iron track	20.00 to 21.00
Forge fire	11.00 to 11.50
No. 1 yard wrought long	23.00 to 24.00
Light iron	9.00 to 10.00
Cast borings (clean)	16.50 to 17.00
Machine-shop turnings	13.50 to 14.00
Mixed borings and turnings	13.00 to 13.50
Iron and steel pipe (1 in. diam., not under 2 ft. long)	16.00 to 17.00
Stove plate	24.50 to 25.50
Locomotive grate bars	26.00 to 27.00
Malleable cast (railroad)	24.00 to 25.00
Old car wheels	35.00 to 36.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton:

No. 1 machinery cast	$39.00 to $40.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	38.00 to 39.00
No. 1 heavy cast, not cupola size	28.00 to 29.00
No. 2 cast (radiators, cast boilers, etc.)	28.00 to 29.00

The report of the Superior Steel Corporation, Pittsburgh, for the 6 months ended June 30, shows net sales of $6,451,843, gross profits of $1,980,510, other income of $49,942. The net income was $1,794,381. Surplus of the company which Jan. 1, 1920, stood at $731,252, amounted June 30, to $1,323,212 after dividends, taxes and sinking fund disbursements.

A bronze bust of George Westinghouse, Pittsburgh inventor and pioneer manufacturer, has been installed in the McKinley Memorial Building at Niles, Ohio. The replica is the work of J. Massey Rhind, New York sculptor, who has created likenesses of many industrial leaders.

Cincinnati

CINCINNATI, Oct. 12.

Pig Iron.—While the market remains exceptionally dull, some inquiries for carload lots were received at the beginning of the week and some dealers profess to see better buying in sight, though not in such volume as was evidenced during the summer months. No sales of any consequence were made in this territory during the past week, with the exception of one lot of 700 tons of foundry for the Louisville & Nashville Railroad. This iron was taken by a Southern furnace, and it is reported that slightly lower than $42, Birmingham base, was done. This cannot be confirmed, however. Another inquiry for 500 tons from Louisville has been withdrawn, as this iron was wanted in anticipation of a large casting order being received by the interest sending out the inquiry. Only part of the casting order went to this firm, and as it is not to be filled for some weeks, the inquirer decided to hold off buying for the present. Resale iron continues to be the chief factor in the market, and a tonnage is being offered. In some cases, this is being disposed of at a loss to the seller, but we note one sale of 350 tons of Southern iron which brought the full schedule. No Northern iron is being disposed of and for this reason it is difficult to get a line on what furnaces are willing to accept. Reports are more persistent that a number of furnaces in southern Ohio and Southern districts will go out of blast during the month, rather than pile iron on their yards at the present cost of production. Resale ferroalloys are now appearing in the market, and these are being offered by sellers below the present market quotations.

Based on freight rates of $4.50 from Birmingham and $2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base price)	$46.50
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	47.75
Ohio silvery, 8 per cent sil.	62.52
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	48.52
Basic Northern	48.52
Malleable	48.52

Finished Material.—The demand for finished material has died down to almost nominal proportions, and few sales of any tonnages are being made. Some manufacturers are still encountering trouble in securing shipments from mills, but these are located mostly in the central western part of the state, those in the southern part getting good shipments. The order of the Interstate Commerce Commission revoking permits for coal cars being used otherwise than in the coal trade is expected to have a further influence in delaying shipments. While there is some talk of lower prices being quoted on finished products, these cannot be confirmed, as no actual sales at these prices have been made recently. Mills, however, are reported to be in better position as regards deliveries, and are willing to inspect specifications submitted to them, and if the tonnage is desirable, to place the order on the books. Warehouses report business fair. Prices on some lines of steel products underwent a revision downward last week. The fact that warehouses are able to place orders without paying the premium prices demanded for many months back is the explanation of the decline. Warehousemen point out that their prices are always governed by prices at the mills, and the higher prices quoted here in comparison with other markets represent the additional freight charges paid on shipments from the mills. Stocks in warehouses are fairly good, with the exception of black and galvanized sheets, which are still scarce, and shipments of which have not improved to any appreciable extent within the past two months. The new prices on finished materials, as quoted by Cincinnati warehouses, follow:

Steel bars, 4.00c. base; shapes, ¼-in. and heavier, 4.10c.; plates, 4.50c.; cold rolled rounds, 1½-in. and over, 6.25c.; cold rolled rounds, under 1½-in., and flats, squares and hexagons, 7c. base; steel bands, 6c. base; No. 10 blue annealed sheets, 7c. base; Nos. 14 and 16 blue annealed sheets, 7½c. base; black sheets, 28-gage, 9 to 10c.; galvanized sheets, 28-gage, 10c. to 11c.; wire nails, $4.50 per keg base.

Coke.—The coke market is dull, and while some cancellations are being received, prices have not been affected. Some shippers are still far behind on contracts, and the car supply from the Connellsville field in particular is not much better than it was during the early summer months.

Old Material.—The scrap market is stagnant, very few sales being made, and these being confined to small lots. Dealers report that they do not expect any heavy buying until after the Presidential election is out of the way, and some even go so far as to say that it will be the first of the year before things pick up again. Prices, which are largely nominal in the absence of trading, can still be quoted at the figures prevailing last week.

We quote dealers' buying prices:

	Per Gross Ton	
Bundled sheets	$12.50	to $13.50
Old iron rails	25.50	to 26.50
Relaying rails, 50 lb. and up	49.50	to 50.50
Rerolling steel rails	30.50	to 31.50
Heavy melting steel	20.50	to 21.50
Steel rails for melting	21.50	to 22.50
Car wheels	35.50	to 36.50
	Per Net Ton	
No. 1 railroad wrought	$22.50	to $23.50
Cast borings	9.50	to 10.00
Steel turnings	8.00	to 8.50
Railroad cast	31.50	to 32.50
No. 1 machinery	34.50	to 35.50
Burnt scrap	21.50	to 22.50
Iron axles	34.00	to 34.50
Locomotive tires (smooth inside)	22.00	to 23.00
Pipes and flues	13.50	to 14.00
Malleable cast	23.50	to 24.00
Railroad tank and sheet	13.50	to 14.00

Buffalo

BUFFALO, Oct. 11.

Pig Iron.—Foundry week finds many Buffalo furnacemen absent and conditions quiet. Sales other than resale iron have been practically negligible. There has been considerable of this kind of iron sold at varying prices below that quoted by merchant furnaces. The producers themselves are doing very little selling and are not anxious, most of them having covered their books for the first quarter of next year to a comfortable extent. One producer reports the sale of a few carloads of foundry iron at a base price of $50. Another sale of 150 tons of the low and medium silicon foundries is reported at $50 and $51.25 respectively. This was for delivery over the first three months of next year. A sale of malleable to a company which caters to railroad trade has been made at $47. A price of $51.25 was quoted by a Buffalo concern to a buyer in the market for about 600 tons of malleable iron, but no sale at that figure is reported. This was for delivery as soon as possible. Coke cannot be had under $16.50, and even $17 and $17.50 is being paid by some furnaces here. With these prices, producers say, they cannot see their way clear to lower selling prices at this time, but resale foundry iron can be had at $45.

We quote f.o.b. Buffalo, the lower prices of foundry grades being resale:

No. 1 foundry, 2.75 to 3.25 sil.	$48.00	to $53.00
No. 2 X foundry, 2.25 to 2.75 sil.	46.25	to 51.25
No. 2 plain, 1.75 to 2.25 sil.	45.00	to 50.00
Basic		48.00
Malleable	47.00	to 47.50
Lake Superior charcoal	58.00	to 60.00

Finished Iron and Steel.—The market is quieter for most materials this week, with some of the higher premium mills shown to have eased up slightly on their higher prices. Inquiry is dropping off and there is not nearly the anxiety to place tonnage there was some weeks ago. Plate tonnage, with guaranteed delivery of two weeks to four weeks, is being accepted by one mill at as low as 3.25c. Other plate tonnages are bringing 3.50c. Some lots of 200, 300 and 400 tons have been placed at these figures. The bar market is weaker and some tonnages have been sold as low as 3.25c. Prices of 3.50c. and 3.75c. have been paid for some lots, and one mill here late last week took a small tonnage at 4c. The structural market is also weaker, and although 3.25c. is said to be the general quotation, some shapes are said to have been taken at 3.10c. The bridge steel for the highways department of the Ontario, Canada, provin-

cial government amounts to about 750 tons, and is said to have been awarded to the Hamilton Bridge Co., Hamilton, Ont. Wire and tubular products are in the same heavy demand as heretofore.

Warehouse prices f.o.b. Buffalo are: Steel bars, 4.65c.; shapes, 4.15c.; plates, 4.30c.; No. 10 blue annealed sheets, 7.15c.; No. 28 black sheets, 9.10c.; No. 28 galvanized sheets, 10.60c.; hoops, 6.60c.

Warehouse Business.—Business has improved somewhat, though it is not up to top-notch figures. There is a tendency toward softer prices and one local warehouse has reduced its prices $7 per ton on shapes and $8 per ton on plates. Warehousemen look for the usual stimulus to business in the grades affected. There is no change announced in other warehouse grades as yet.

Old Material.—The market is in the doldrums at this time, with little activity in either sales or inquiry. Mid-October finds mills well covered for the next few weeks and not anxious to buy. The prices of several commodities have weakened, and are held to their present levels only by the activities of dealers seeking material to fill contracts. From both inside and outside the district the demand has died away.

We quote dealers' asking prices per gross ton, f.o.b. Buffalo as follows:

Heavy melting steel, regular grades	$25.00 to $26.00
Hydraulic compressed	22.50 to 23.00
Low phos., 0.04 and under	33.00 to 34.00
No. 1 railroad wrought	31.50 to 32.50
No. 1 machinery cast	40.00 to 41.00
Iron and steel axles	41.00 to 42.00
Car wheels	40.00 to 41.00
Railroad malleable	32.00 to 32.50
Machine-shop turnings	14.00 to 15.00
Heavy axle turnings	19.50 to 20.50
Clean cast borings	20.00 to 21.00
Iron rails	31.00 to 32.00
Locomotive grate bars	25.00 to 26.00
Stove plate	31.50 to 32.50
Wrought pipe	20.50 to 21.50
No. 1 busheling	19.50 to 20.50
Bundled sheet stampings	16.50 to 17.50

St. Louis

ST. LOUIS, Mo., Oct. 11.

Pig Iron—There has been practically no business done the past week in the pig iron market in continuation of the condition that has prevailed now for several weeks. Melters seem to be busy and have about all the iron they need either in their yards or on the way from the furnaces. There is a disposition on the part of some, because of pressing demand, to urge forward shipment or iron in advance of contract dates, while there are also some evidences of a disposition in a few quarters to ask that deliveries be held back. A few requests are reported as having come in for cancellation of orders, but these requests are very few and they are also being denied very definitely. No price changes are reported and the lack of transactions prevents determining very accurately the tone of the market at this point. No. 2 Southern stands at $42 Birmingham.

Coke—No business has been reported the past week in coke and no change in the prices made heretofore, although there is a little easier feeling.

Finished Iron and Steel—In finished products buying and deliveries are about the same as heretofore reported, with the flow of material slightly better as the railroads regain control of the shipping situation. Users generally feel safer as to arrival of material than they have. No changes in prices are reported by the principal interests, although there seems to be an expectation that there will be lower figures before very long in response to the general tendency of all commodities.

We quote for stock out of warehouse as follows: Soft steel bars, 4.07½c.; iron bars, 4.50c.; structural material, 4.17½c.; tank plates, 4.37½c.; No. 10 blue annealed sheets, 7.27½c.; No. 28 black sheets, cold rolled, one pass, 8.20c.; No. 28 galvanized, black sheet gage, 9.70c.

Old Material.—The scrap market continues soft with prices definitely lower and no trading going on either with consumers or among the dealers, who are disposed to keep hands off until they can get a better line on the market. Considerable scrap came out during the week, lists being issued by the Wabash, Missouri, Kansas & Texas, St. Louis and San Francisco, Mobile & Ohio and the Pennsylvania railroads all closing this week. These helped to depress the market considerably.

We quote dealers' prices, f.o.b. consumers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$31.00 to $31.50
Old steel rails, rerolling	34.00 to 34.50
Old steel rails, less than 3 ft.	22.00 to 22.50
Relaying rails, standard sections subject to inspection	45.00 to 50.00
Old car wheels	34.50
No. 1 railroad heavy melting steel	22.50 to 23.00
Heavy shoveling steel	21.00 to 21.50
Ordinary shoveling steel	20.50 to 21.00
Frogs, switches and guards, cut apart	22.50 to 23.00
Ordinary bundled sheets	11.00 to 11.50

Per Net Ton

Heavy axles and tire turnings	$13.00 to $13.50
Iron angle bars	28.00 to 28.50
Steel angle bars	20.50 to 21.00
Iron car axles	39.00 to 39.50
Steel car axles	32.00 to 32.50
Wrought arch bars and transoms	31.00 to 31.50
No. 1 railroad wrought	22.50 to 23.00
No. 2 railroad wrought	21.50 to 22.00
Railroad springs	20.50 to 21.00
Steel couplers and knuckles	22.00 to 22.50
Locomotive tires, 42 in. and over, smooth inside	18.00 to 18.50
Cast-iron borings	12.50 to 13.00
No. 1 busheling	19.00 to 19.50
No. 1 boiler, cut to sheets and rings	15.00 to 15.50
No. 1 railroad cast	32.00 to 32.50
Stove plate and light cast	24.00 to 24.50
Railroad malleable	22.50 to 23.00
Agricultural malleable	21.50 to 22.00
Pipes and flues	16.00 to 16.50
Heavy railroad sheet and tank	15.00 to 15.50
Railroad grate bars	23.50 to 24.00
Machine-shop turnings	10.50 to 11.00
Country mixed	18.00 to 18.50
Uncut railroad mixed	19.00 to 19.50
Horseshoes	24.50 to 25.00
Brake shoes	20.50 to 21.00

Cleveland

CLEVELAND, Oct. 12.

Iron Ore.—The amount of ore on Lake Erie docks on Oct. 1 was 1,000,000 tons greater than the amount on the same date a year ago. Dock stocks the first of this month were 9,203,206 gross tons as compared with 8,203,427 tons at the same time a year ago. Receipts at Lake Erie ports last month were 7,455,979 tons, and for the season until Oct. 1, 31,959,201 tons as compared with 26,389,502 tons during the same period last year. Shipments from Lake Erie docks to inland furnaces during September showed considerable gain over August, being 5,596,554 tons. Shipments from these docks during the season up to Oct. 1 were 23,222,770 tons as compared with 20,724,413 tons during the same period last year. September receipts at other than Lake Erie ports were 1,507,590 tons, and receipts at these furnaces until Oct. 1 were 10,733,758 tons. For the same period last year they were 7,528,816 tons.

We quote delivered lower Lake ports: Old range Bessemer, $7.45; old range non-Bessemer, $6.70; Mesaba Bessemer, $7.20; Mesaba non-Bessemer, $6.55.

Pig Iron.—The market is weak, but there is not enough activity to test prices. There are unconfirmed reports of basic iron being offered by a producer as low as $44, but in the absence of additional sales in this market $46 is regarded as the established price. The only activity reported in basic iron is the purchase of 2000 tons by the N. & G. Taylor Co., which advised a local producer who quoted $48.50 that it had bought at a lower price. Owing to the slowing down of some steel plants, stocks of basic iron are accumulating. Foundry iron is very quiet. Considerable resale iron is being offered, but there is practically no demand for it. We note the sale of 500 tons of foundry iron for the first quarter subject to prices prevailing at time of shipment. The usual quotation on foundry iron is $47, but an inquiry from Salem, Ohio, brought out a $43 price. However, information is lacking as to whether this was a furnace or resale price. A western Pennsylvania consumer is inquiring for 500 tons of foundry iron for the first quarter and an Indiana melter for 1000 tons of malleable iron. Furnaces are still able to ship all the iron they are making, but unless the foundry

situation improves soon there probably will be a surplus of this grade of iron.

We quote delivered Cleveland as follows, based on the new freight rates, these being a 56c. switching charge for local iron, a $1.96 freight rate from Valley points, a $3.36 rate from Jackson and $6.67 from Birmingham:

Basic	$47.96
Northern No. 2 fdy., sil. 1.75 to 2.25	46.56
Southern fdy., 2.25 to 2.75	49.92
Ohio silvery, sil. 8 per cent	63.36
Standard low phos., Valley furnace	58.00 to 59.00

Coke.—Prices on spot shipment furnace coke are firm. We note the purchase by a Cleveland interest of two lots of 10 cars each, one at $17.25 and the other at $17.50. Standard Connellsville foundry coke is quoted at $18. The Worthington Pump & Machinery Corporation is inquiring for 15,000 tons of foundry coke for the first half of next year delivery to its various plants.

Semi-Finished Steel.—There is practically no demand for semi-finished steel, and as a result the price situation is not clear. In spite of recent sales of rerolling billets at $50 some of the mills are still asking $60 for billets, and a small lot sale is reported at that price. We note the sale of a small lot of forging billets at $64 at mill, or $6 below the recent minimum quotation.

Finished Iron and Steel.—There is very little demand for finished steel. Improvement in deliveries has caused an easing up in the steel bar situation, and steel bars are now being sold for immediate shipment at 3.50c., although one mill is still taking orders at 4c. Some agricultural implement plants, particularly those making implements used with farm tractors, have slowed down operations and held up steel. One independent mill is reported to have met the Carnegie Steel Co. price by reducing its price to 2.35c. on a steel bar contract to prevent a cancellation. There is very little inquiry for plates or structural material. The leading Cleveland producer has reduced prices on tank plates to the general market price of 3.25c. Some fabricators are holding up steel shipments because of the falling off in building work. The Mt. Vernon Bridge Co. has placed 650 tons for railroad bridge work. Hard steel bars have settled down to a 3.75c. maximum price. Warehouse business is light. Jobbers now have good stocks of about all lines of steel.

Cleveland warehouses quote steel bars at 3.34c. to 3.84c.; plates, 3.64c., and structural material, 3.44c.; No. 9 galvanized wire, 4.70c.; No. 9 annealed wire, 4c.; No. 28 black sheets, 8.50c.; No. 28 galvanized, 9.50c.; No. 10 blue annealed, 7c.

Sheets.—The sheet market is dull and prices show a further softening tendency. The leading Cleveland producer has reduced prices to from 5c. to 5.25c. for blue annealed sheets in the heavier gages, and to from 5.50c. to 6.75c. for lighter gages, and to 6.75c. for black sheets. Other mills are quoting blue annealed sheets at 5.25c. Some automobile body sheets have been placed at 7.85c., the price that has ruled recently.

Bolts and Nuts.—The demand for bolts and nuts is holding up fairly well, but buying is limited to early requirements. Deliveries have improved but little. Prices are irregular, some makers going 5 to 10 per cent below regular quotations. However, local makers claim they are having no trouble in booking orders at regular prices, provided they can make the desired deliveries.

Small machine bolts, rolled threads, 25 to 10 per cent off list; same sizes in cut threads, 25 per cent off list; larger and longer sizes, 25 per cent off list; carriage bolts, smaller and shorter, rolled threads, 20 and 10 per cent off; cut threads and larger and longer sizes, 20 per cent off list; lag bolts, 40 per cent off list; plow bolts, Nos. 1, 2 and 3 head, 25 per cent off list, the 20 per cent extra for other style heads being unchanged; machine bolts, both smaller and shorter, and larger and longer sizes, 10 per cent off list; hot pressed sq. and hex. blank nuts, 50c. off list; tapped nuts, list; cold pressed sq. and hex. blank nuts, list plus $1; semi-finished hex. nuts, 40 per cent off list.

Old Material—The scrap market is very weak and in an unsettled condition. It is entirely a dealers' market and there is a wide range in prices, but quotations on a number of grades are nominal. Practically all the sales that are being made are for quick shipment to dealers who are anxious to make deliveries before the expiration of contracts. Mills are not in the market and some with reduced operations are holding up scrap deliveries. Dealers are buying heavy melting steel at as low as $24. A slowing down of foundry operations has resulted in a reduction on cast scrap of probably $10 a ton. However, dealers say they are unable to move this grade at any price.

Dealers quote delivered consumers yards in Cleveland and vicinity, as follows:

Heavy melting steel	$24.50 to $25.50
Steel rails under 3 ft	28.00 to 29.00
Steel rails rerolling	39.00 to 40.00
Iron rails	32.00 to 33.00
Iron car axles	41.00 to 42.00
Low phos. melting scrap	26.00 to 27.00
Cast borings	16.00 to 16.50
Machine shop turnings	11.75 to 12.00
Mixed borings and short turnings	16.00 to 16.50
Short turnings for blast furnaces	16.00 to 16.50
Compressed steel	21.50 to 22.00
Railroad wrought	28.00 to 29.00
Railroad malleable	31.50 to 32.00
Steel axle turnings	21.00 to 21.50
Light bundled sheet stampings	14.00 to 14.50
Drop forge flashings over 10 in	18.50 to 19.00
Drop forge flashings under 10 in	18.50 to 19.00
No. 1 cast	30.00 to 32.00
No. 1 busheling	19.00 to 20.00
Railroad grate bars	29.00 to 30.00
Stove plates	28.50 to 29.00
Cast-iron wheels	39.00 to 40.00
Pipes and flues	24.50 to 25.00

Boston

BOSTON, Oct. 11.

Pig Iron.—Since last reports there has not been sufficient buying in this district direct from furnaces to really establish a basis for prices, and they therefore cannot be considered anything but nominal. One eastern Pennsylvania interest has offered to cut $50 furnace base to secure 1921 tonnage, but has taken no business. But one direct furnace sale, 150 tons Sloss, silicon 1.75 to 2.25, last quarter delivery, to a Taunton, Mass., melter at $42 furnace base, is reported. Offerings of resale iron at $1 to $2 under furnace prices are larger, but actual transactions have been limited to a dozen cars at the most. Receipts continue large, but a new Delaware & Hudson embargo against Boston & Maine and Boston and Albany shipments is expected to slow up the movement. The City of Atlanta, Ocean Steamship Co., will bring 4500 tons Southern iron from Savannah to Providence, R. I., next week. Pig iron stocks in some foundry yards are subnormal and prompt shipments are requested, while in others they are excessive and delayed deliveries are asked. A majority of foundries are fairly busy. Delivered pig iron prices follow:

East. Pa., sil. 2.25 to 2.75	$55.31 to $56.31
East. Pa., sil. 1.75 to 2.25	54.06 to 55.06
Buffalo, sil. 2.25 to 2.75	54.71 to 55.71
Buffalo, sil. 1.75 to 2.25	53.46 to 54.46
Virginia, sil. 2.75 to 3.25	57.58 to 58.58
Virginia, sil. 2.25 to 2.75	55.83 to 56.83
Virginia, sil. 1.75 to 2.25	54.58 to 57.58
Alabama, sil. 2.75 to 3.25	51.91 to 54.91
Alabama, sil. 2.25 to 2.75	50.91 to 53.91
Alabama, sil. 1.75 to 2.25	49.66 to 52.66

Coke.—Interest in foundry coke centers in 1921 contracts. Producers report fairly active bookings on the sliding scale basis, but practically nothing at the fixed quotation. A large number of foundries appear in no hurry to cover next year's requirements. The new England Coal & Coke Co. quotes as follows: Spot foundry $22.70 delivered where the freight rate is not more than $3.40; crushed spot coke $17 f.o.b. ovens; 1921 foundry, $15.50 Connellsville base plus $6.20 freight, sliding scale. The Providence Gas Co. quotes 1921 foundry coke at $24.75 delivered, flat rate f.o.b. Connellsville ovens, plus the freight with a minimum oven base charge of not less than $15.50, and maximum of $19.50 sliding scale.

Finished Material.—Stone & Webster has awarded 170 tons of structural steel to Shoemaker-Satterthwaite Co. for the Mutual Potteries, Trenton, N. J., plant pro-

ject. Bids are in on 130 tons for a garage and service station for the Conroy Motor Co., Worcester, Mass. A nearby boiler maker bought 100 tons of plates, 1920 delivery, at 3.50c. f.o.b. Pittsburgh base, but other business has been in small lots at 2.65c. to 3.25c.; 4.00c. plates have disappeared from the market. Limited tonnages of bars, fourth quarter delivery, have been taken at 2.35c. to 3.25c. f.o.b. Pittsburgh base. Structural prices generally range from 2.45c. to 3.10c. f.o.b. Pittsburgh base. Local September bookings of iron and steel ranged from 40 per cent to about 55 per cent of August, and so far this month business has been even smaller. Mill shipments show considerable increase. Round tonnages of billets at price concessions are offered New England rolling mills by brokers.

Warehouse Business.—Due to increased shipments by mills and subsequent larger local stocks, warehouses have revised some of their quotations. Soft steel bars, tire steel, toe calk steel and structural have been reduced 50c. per 100 lbs., concrete bars 50c. to $1, plates $1, and No. 10 blue annealed sheets, $1.20. Prices on cold-rolled steel have been segregated, 1-in. and larger rounds now being quoted at $8 per 100 lb. base, 15/16-in. rounds and smaller at $9 base, and squares, hexagons and flats at $10 base. Quotations on 1-in. and larger rounds represent a drop of 50c. per 100 lbs. Wayne iron is $1 higher.

Jobbers quote: Soft steel bars, $5.50 to $6 per 100 lb. base; flats, $6.50 to $6.85; concrete bars, $5.50; tire steel, $6.50 to $7; spring steel, open hearth, $11; crucible, $16; steel bands, $8 to $8.25; steel hoops, $9; toe calk steel, $7.50; cold-rolled steel, $8 to $10; structural, $5 to $6; plates, $5.50 to $6.05; No. 10 blue annealed sheets, $7.80; No. 28 black sheets, $9.90; No.28 galvanized sheets, $11.50; refined iron, $5.50 to $8; best refined, $7.50; Wayne, $9.50; band iron, $8; hoop iron, $9; Norway iron, $20.

Old Material.—The market is demoralized. Offerings are extremely heavy, while buying, except against a few old dealers' contracts, is at a standstill, and prices are unstable. Apparently there is no established market on No. 1 machinery cast, prices depending on circumstances. A Connecticut foundry secured three cars at $36 delivered, which, if $2 freight is deducted, brings the local price down to $34, but the range on dealers' prices here seems to be $37 to $38. A small tonnage of stove plate was purchased on a new contract at around $27 shipping point, but it is offered to-day in small lots at $1 to $2 less. Everybody apparently has stopped buying heavy melting steel and this fact has influenced prices on other kinds of scrap. Cast iron borings are in moderate demand and the steadiest thing on the list, the decline during the past week not exceeding $50c., as against $1 to $2, at least, on other materials. Two 100-ton lots of furnace scrap, ungraded pig iron, were taken by Massachusetts foundries at $45.50 delivered, to replace commercial scrap. Local yard prices on old material follow:

No. 1 heavy melting steel	$17.00 to $18.50
No. 1 railroad wrought	23.00 to 24.00
No. 1 yard wrought	19.00 to 20.00
Wrought pipe (1 in. in diameter, over 2 ft. long)	14.00 to 16.00
Machine shop turnings	12.00 to 13.00
Cast-iron borings	16.00 to 17.00
Heavy axle turnings	14.00 to 15.00
Blast furnace borings and turnings	11.50 to 12.50
Forged scrap	11.00 to 12.00
Bundled skeleton	11.00 to 12.00
Street car axles	28.00 to 30.00
Car wheels	35.00 to 37.00
Machinery cast	37.00 to 39.00
No. 2 cast	35.00 to 36.00
Stove plate	25.00 to 26.50
Railroad malleable	25.50 to 36.50
Rerolling rails	31.00 to 32.00

To relieve the domestic fuel shortage in the city of Youngstown and adjacent communities, President James A. Campbell of the Youngstown Sheet & Tube Co. offered to dealers through the Chamber of Commerce any quantity of Kentucky coal at $10 per ton. This price included cost plus freight and purchasing expense, and was without profit to the company.

The new cement plant of the Bessemer Limestone & Cement Co., Youngstown, Ohio, which is being erected at Bessemer, Pa., and will have an annual capacity of 1,000,000 bbl., will be started in a preliminary way about the latter part of October. Some of the units have been given trial runs.

Philadelphia

PHILADELPHIA, Oct. 12.

In the exceedingly quiet market of the past week there has been little or no change in the situation, except that resale pig iron is being offered more freely. Valley basic has been quoted at $43, furnace; Buffalo foundry for resale at $45, Buffalo, and malleable at $46.25, Buffalo. Eastern furnaces adhere to the quotations which have been in effect for some weeks, but are making no sales of importance. There is no interest among buyers in first quarter contracts. Most of the Eastern furnaces will carry over into next year a considerable part of their contract obligations.

Demand for steel is so light that no real test of prices is afforded. Nevertheless there are weaker spots in the market. Steel bars are now more freely offered at 3.50c., Pittsburgh, and 3.25c. would be acceptable on a desirable specification. The plate market remains at 3.25c., Pittsburgh, but one or two makers are now willing to sell specification plates at this level, whereas recent orders were taken at 3.50c.

The iron and steel trade looks forward with much interest to the meeting of the American Iron and Steel Institute in New York, on Oct. 23, at which time Judge Gary is expected to make some announcement that will be indicative of the Steel Corporation price policy for next year.

There is concern over the attitude of buyers, who are insisting on cancellation of specific orders for steel or revision of prices on old orders to the present market level.

Pig Iron.—While Eastern furnaces are rigidly adhering to the quotations which have been in effect for some weeks, they are making virtually no sales, and the only activity is in resale iron, which is being sold at prices below those which furnaces are willing to quote. Much of the resale iron offered is for shipment from other districts, but even with the freight added the prices are $1 to $2 a ton below Eastern iron. Some of the automobile companies attempted to cancel pig iron contracts with Buffalo furnaces, but so far as known every furnace declined to cancel even when the contract price was considerably below current quotations, stating that to do so would be an admission that a pig iron contract is little more than a buyer's option. The outcome of these negotiations is the offering for resale of numerous lots of automobile companies' iron. One lot of 3000 tons for delivery over the remainder of the year is offered at $45, Buffalo, furnace, and smaller lots are available at the same price. Thus, this iron can be delivered in eastern Pennsylvania at $50.46, which is almost $2 under the price at which the same grade of iron was last sold by Eastern merchant furnaces. Likewise, Buffalo malleable for resale is available at $46.25, Buffalo, and one lot of several hundred tons has been sold for delivery in this district at $51.50. An eastern Pennsylvania furnace quotes $53.40, delivered Philadelphia, on malleable. While makers of Eastern basic are well sold up for the remainder of the year, and therefore not anxious to make concessions in prices, basic has been offered by Valley steel makers at $43, Valley, which with a freight rate of $6.16, makes the delivered price about $1 under last reported sales of Eastern basic, delivered. The N. & G. Taylor Co., Cumberland, Md., which came into the market last week for 2000 tons of basic for delivery over the remainder of the year, declined to buy at $44.50, Valley furnace, and reported its ability to cover its requirements below that figure. Resumption of work at the anthracite coal mines in northeastern Pennsylvania has brought about a renewal of the coal car order, which was temporarily suspended by the Philadelphia & Reading and Pennsylvania railroads, and pig iron cannot now be shipped in cars whose sides are more than 38 in. high. The result of this has been that some consumers, particularly in New England, who a week or so ago were asking that shipments of iron be held up are now urging shipments. Eastern sellers of iron do not look for long continued weakness in the pig iron market, and they base this prediction on the continued high prices and scarcity of coke. The coke situation, instead of improving, seems to be grow-

ing worse, and one Eastern furnace was banked all of last week because of insufficient coke. Complaints made to the Pennsylvania Railroad have brought no relief, as that road admits a serious congestion of traffic between Altoona, Pa., and the coke regions. Spot furnace coke is quoted from $15 to $17, Connellsville, while contract coke is offered for the remainder of the year and first quarter of next year at $14, a price that does not hold out much hope to furnace operators of lower production costs. Aside from the basic inquiry above noted, the only sizable inquiry in this market is for 500 tons of standard low phosphorus iron, on which $60, furnace, has been quoted by an Eastern maker.

The following quotations are for iron delivered in consumers' yards in Philadelphia or vicinity, except those for low phosphorus iron, which are f.o.b. furnace:

East. Pa. No. 2 plain, 1.75 to 2.25	$52.26 to $52.54
East. Pa. No. 2X, 2.25 to 2.75 sil.	53.51 to 53.79
Virginia No. 2 plain, 1.75 to 2.25 sil.	53.74 to 55.74
Virginia No. 2X, 2.25 to 2.75 sil.	54.99 to 56.99
Basic deliv. Eastern Pa.	51.26 to 51.52
Gray forge (nominal)	47.10 to 48.50
Standard low phos. (f.o.b. furnace)	60.00
Malleable	51.50 to 53.40
Copper bearing low phos. (f.o.b. furnace)	57.00

Ferroalloys.—Demand for ferromanganese and spiegeleisen has fallen away to the vanishing point. Resale ferromanganese is still obtainable at $160 to $165, seaboard, but consumers seem well supplied and are taking no interest in the market. An importer of British ferromanganese received word last week of the foundering of a ship which was bringing 2000 tons of ferromanganese to the United States. Spiegeleisen is nominally $80, furnace.

Semi-Finished Steel.—The quotation for open-hearth rerolling billets is nominally $55, Pittsburgh, but there have been no sales during the past week. Forging billets are quoted at $60 to $65, Pittsburgh.

Plates.—Almost no business in plates is being done, and the market may be quoted at 3.25c., Pittsburgh, though buyers have attempted to cover at around 3c. One company, which has been getting 3.50c. for specification plates, is now willing to accept orders at 3.25c. Plate mills in the East are operating at a reduced rate, and some have only two or three weeks' rollings ahead of them.

Structural Material.—Only small lots are being booked, and the prevailing price on all current business is 3.10c., Pittsburgh, though sales have been made around 3.15c., Eastern mill.

Old Material.—The dullness in the scrap market, noted last week, is even more in evidence, sales being at a minimum. Pipe scrap is about $1 a ton lower, but other grades are as quoted a week ago. Heavy melting steel has been bought by brokers within the past few days at $23 and $23.50. We quote for delivery at consumers' works in this district as follows:

No. 1 heavy melting steel	$23.00 to $23.50
Steel rails, rerolling	38.00 to 39.00
No. 1 low phos., heavy 0.04 and under	33.00 to 34.00
Car wheels	41.00 to 43.00
No. 1 railroad wrought	31.00 to 32.00
No. 1 yard wrought	26.00 to 27.00
No. 1 forge fire	17.50 to 18.00
Bundled skeleton	17.50 to 18.00
No. 1 busheling	20.00 to 21.00
No. 2 busheling	17.00 to 18.00
Turnings (short shoveling grade for blast furnace use)	18.00 to 19.00
Mixed borings and turnings (for blast furnace use)	17.00 to 17.50
Machine-shop turnings (for rolling mill and steel works use)	18.50 to 19.50
Heavy axle turnings (or equivalent)	20.00 to 21.00
Cast borings (for rolling mills)	22.00 to 23.00
Cast borings (for chemical plants)	24.00 to 25.00
No. 1 cast	39.00 to 40.00
Railroad grate bars	29.00 to 30.00
Stove plate (for steel plant use)	26.50 to 27.00
Railroad malleable	27.50 to 28.50
Wrought iron and soft steel pipes and tubes (new specifications)	21.00 to 22.00
Iron and axles	45.00 to 46.00
Steel car axles	42.00 to 44.00

Bars.—The willingness of some makers of bars to accept orders for delivery in 30 to 90 days at 3.50c., Pittsburgh, is more apparent. One mill would quote 3.25c. on a desirable specification, though its price on small lots is 3.50c. Bar iron continues to be quoted at 4.50c., Pittsburgh, though occasional lots have been sold at 4.25c.

Sheets.—Demand for sheets is not pressing, except for the lighter gages, which are not yet in free supply. Blue annealed sheets are obtainable at 5c. to 5.50c.; black sheets, 6.75c. to 7c., and galvanized at 8.25c. to 8.50c. These are base prices, the lower prices applying generally to the heavier gages and the higher prices to the light gages.

Chicago

CHICAGO, Oct. 12.

The market remains very quiet and it is becoming increasingly evident that buyers expect a reduction in independent steel prices as well as a decline in merchant pig iron, and that they are now waiting for such a development. Some consumers have asked for guarantees against declines as a condition precedent to placing new orders, but thus far have been given no encouragement by the producers. Furnace and mill output in the district is still of large proportions, but shipments are expected to be interfered with by order No. 20 of the Interstate Commerce Commission reinstating the original restriction on the use of coal cars to coal traffic excepting the direction of the mines. This order becomes effective Oct. 15.

Two changes in the operating situation are to be noted which tend to balance each other. The Inland Steel Co. has shut down its 28-in. structural mill and its sheared plate mill, as well as six out of the 10 open-hearth furnaces in the No. 2 plant, thereby reducing its output to about 65 per cent of ingot capacity. On the other hand, the Winconsin Steel Works has increased its production from 55 to 80 per cent.

Pig Iron.—Additional resale material has appeared on the market, but a relatively small tonnage has changed hands. A few cars of No. 2 Southern foundry were sold at $55.50, delivered, or more than $4 below furnace quotations, and a small lot of No. 1 Northern foundry was disposed of at a concession of $4. Other small tonnages of resale have changed hands at from $1 to $3 under the market. The amount of this business, however, is not of sufficient volume to affect the position of the furnaces which are still holding to their prices. Silvery iron is less steady than the other grades and at least one furnace has shaded on occasion to the extent of $2 to $3. Among the new furnace sales was 300 tons of foundry for first quarter shipment, which brought the market price. Inquiries for about 1000 tons of charcoal for first half shipment are before the trade. Of the melters in this district, steel and malleable foundries have curtailed operations to a greater extent than gray iron foundries. While it is recognized that some melters are covered for the remainder of the year, it is common knowledge that others will be forced to make further purchases to maintain their operations through fourth quarter. Although current inquiry is light, it is to be noted that higher silicon irons are relatively in greater demand because of the decline in scrap.

The following quotations are for iron delivered at consumers' yards except those for Northern foundry, malleable and steel-making irons, including low phosphorus, which are f.o.b. furnace and do not include a switching charge averaging 70c. per ton.

Lake Superior charcoal, averaging sil. 1.50 (other grades subject to usual differentials), deliv. at Chicago	$58.50
Northern coke, No. 1 sil. 2.25 to 2.75	48.25
Northern coke foundry, No. 2, sil. 1.75 to 2.25	46.00
Northern high phos.	46.00
Southern coke, No. 1 foundry and No. 1 soft, sil. 2.75 to 3.25	$50.92 to 51.87
Southern coke, No. 2 foundry, sil. 2.25 to 2.75	49.92 to 50.37
Southern foundry, sil. 1.75 to 2.25	48.67
Malleable not over 2.25 sil.	46.50
Basic	46.00
Low phos. (copper free)	60.00
Silvery, 7 per cent	63.32

Ferroalloys.—The market continues dull and prices have softened, ferromanganese now being quoted at $165 to $170 seaboard and spiegeleisen at $80 to $85, furnace. Small lots of resale spiegeleisen have been sold at as low as $70 and $75, furnace.

We quote 75 to 80 per cent ferromanganese, delivered, $165 to $175; 50 per cent ferrosilicon at $85, delivered; spiegeleisen, 18 to 22 per cent, $80 to $85 furnace.

Plates.—The New York Central lines have let additional orders for car repairs bringing the total amount of steel to be furnished in that connection up to 21,000 tons, all of which will be supplied by the leading interest. It is expected that this railroad will let further car repair work which will account for 6000 tons additional. The foremost interest will also supply 7000 tons of plates, shapes and bars and 800 tons of axles for 500 gondola cars to be built for the Clarkson Coal Mining Co. by the Haskell & Barker Car Co. The market is quiet and independents show no signs of abandoning their present quotations.

The mill quotation is 2.65c. to 3.50c., Pittsburgh, the freight to Chicago being 38c. per 100 lb. Jobbers quote 3.78c. to 4.28c. for plates out of stock.

Structural Material.—The only fabricating award to be noted this week is 390 tons for a lamp building, National Lamp Works, Indianapolis, to be furnished by the McClintic-Marshall Co. Bids on the local Federal Reserve Bank, involving 8750 tons of steel, are now expected to be received on Oct. 16. Figures on the California Avenue Bridge, Chicago, involving 1500 tons, will be submitted on Oct. 21. The market in structural shapes is dull and while rumors of reductions in independent quotations are current, no authentic information is available.

The mill quotation is 2.45c. to 3.25c., Pittsburgh, which takes a freight rate of 38c. per 100 lb. for Chicago delivery. Jobbers quote 3.58c. to 4.08c. for materials out of warehouse.

Sheets.—At the annual meeting of the National Association of Sheet and Tin Plate Manufacturers, held at Philadelphia last week, it developed that the average bookings of the members extend about four months ahead. The sentiment of the meeting was unanimous against any revision of contracts and it was evident that while mills will grant suspensions, they will not accept cancellations. The market is still rather slow and prices are softer but lacking in uniformity, making it difficult to ascertain what the ruling independent quotations are.

Mill quotations are 4.35c. to 7.25c. for No. 28 black; 3.55c. to 6c. for No. 10 blue annealed, and 5.70c. to 8.50c. for No. 28 galvanized, these all being Pittsburgh prices, subject to a freight to Chicago of 38c. per 100 lb. The lowest prices are those of March 21, 1919.

Jobbers quote: Chicago delivery out of stock, No. 10 blue annealed, 7.13c.; No. 28 black, $8.10; No. 28 galvanized, 9.60c.

Wire Products—Although there is a noticeable falling off in interest on the part of consumers, the aggregate demand, so far as the leading interest is concerned, is still in excess of production and new orders continue to be taken on a replacement basis. Western plants of the American Steel & Wire Co. are running practically full, while operation throughout the country averages about 85 per cent of capacity. The demand for small railroad spikes from coal mines is particularly brisk. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 1017.

Rails and Track Supplies.—The Santa Fe has closed contracts for 120,000 tons of rails for 1921 delivery, of which 80,000 tons will be rolled in Colorado and 40,000 tons here. The Northern Pacific has let 30,000 tons and the Soo Line 10,000 tons, as well as 500,000 tie plates also to be rolled here. The Chicago, Terre Haute and Southeastern has placed 1000 tons with an Eastern mill. Among Western lines which have not yet completed arrangements for their 1921 rails are the Chicago & Northwestern, which wants about 55,000 tons; the Omaha, which is inquiring for 10,000 tons, and the Rock Island, which is figuring on 40,000 tons. Thus far information at hand indicates that Western railroads have contracted for over 400,000 tons of rails for next year. Moderate tonnages of track bolts and spikes continue to be placed for early delivery.

Standard Bessemer rails, $45 to $55; open hearth rails, $47 to $57. Light rails, $2.45c. to 3.50c., f.o.b. makers' mills. Standard railroad spikes, 3.35c. to 4c., Pittsburgh. Track bolts with square nuts, 4.60c. to 5c., Pittsburgh. Steel tie plates, 3c. to 4c. and steel angle bars, 2.75c., Pittsburgh and Chicago; tie plates, iron, 3.75c. to 4c.; f.o.b. makers' mills.

Bars.—Bar mills in this district are still in a strong position with bookings which will carry them several months ahead, but it is said that some Eastern independents will work out their present commitments within a few weeks. Except for the fact that one or two hard steel bar mills will now take orders at 3.25c. mill, there have been no evidences in this district of a deviation from former quotations on bars.

Mill prices are: Mild steel bars, 2.35c. to 3.75c., Pittsburgh, taking a freight of 38c. per 100 lb.; common bar iron, 3.75c. to 4c., Chicago; rail carbon, 3.75c. to 4c. mill.

Jobbers quote 3.48c. to 3.98c. for steel bars out of warehouse. The warehouse quotation on cold rolled steel bars is 5.90c. for rounds and 6.40c. for flats and squares, an extra of 15c. per 100 lb. applying to orders exceeding 1000 lb. and under 2000 lb. and an extra 35c. for orders up to 1000 lb. Jobbers quote hard and medium deformed steel bars at 4.63c. base.

Cast-Iron Pipe.—The market is exceedingly dull and in the absence of attractive inquiries it is not clear whether makers would make recessions from present prices or not. Undoubtedly such action would depend to a large extent on developments in the pig iron market.

We quote per net ton f.o.b. Chicago, ex-war tax as follows: Water pipe, 4-in., $88.10; 6-in. and above, $83.10; class A and gas pipe, $4 extra.

Bolts and Nuts.—A falling off in demand is noticeable in some directions, but current business is still so large that manufacturers are unable to catch up appreciably on their commitments. Some implement manufacturers have closed fourth quarter contracts, and a number of automobile companies are anxious to cover for their needs six months ahead. Revised prices are published on page 1017.

Jobbers quote structural rivets, 5.08c. to 5.73c.; boiler rivets, 5.18c. to 5.83c.; machine bolts up to ⅞ x 4 in., 20 per cent off; larger sizes, 10 off; carriage bolts up to ⅞ x 6 in., 10 off; larger sizes, 5 off; hot pressed nuts, square tapped and hexagon tapped, list price plus $1.15; blank nuts, list price plus $1.15; coach or lag screws, gimlet points, square heads, 30 per cent off. Quantity extras are unchanged.

Old Material.—Consumers continue to postpone purchases on the assumption, apparently, that the market has not yet reached bottom. Trading is confined almost wholly to dealers and prices have generally declined from the quotations of a week ago. Railroad scrap is coming into the market in volume. The Pere Marquette, Chicago, Great Western and St. Paul are offering 1500 tons each, the Grand Trunk Western 1100 tons, and the Chicago & Western Indiana 800 tons.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	$34.00 to $34.50
Relaying rails	57.50 to 62.50
Car wheels	36.00 to 36.50
Steel rails, rerolling	34.00 to 34.50
Steel rails, less than 3 ft.	24.00 to 24.50
Heavy melting steel	22.00 to 22.50
Frogs, switches and guards, cut part	22.00 to 22.50
Shoveling steel	21.00 to 21.50
Low phos. heavy melting steel	26.00 to 26.50
Drop forge flashings	18.50 to 19.00
Per Net Ton	
Iron angles and splice bars	31.50 to 32.00
Steel angle bars	21.50 to 22.00
Iron arch bars and transoms	33.00 to 33.50
Iron car axles	40.00 to 40.50
Steel car axles	31.50 to 32.00
No. 1 busheling	17.50 to 18.00
No. 2 busheling	10.00 to 11.00
Cut forge	19.50 to 20.00
Pipes and flues	14.00 to 14.50
No. 1 railroad wrought	20.00 to 20.50
No. 2 railroad wrought	19.50 to 20.00
Steel knuckles and couplers	22.50 to 23.00
Coil springs	23.50 to 24.00
No. 1 cast	29.00 to 30.00
Boiler punchings	21.00 to 22.00
Locomotive tires, smooth	20.00 to 21.00
Machine shop turnings	8.50 to 9.00
Cast borings	11.50 to 12.00
Stove plate	25.50 to 26.50
Grate bars	24.00 to 24.50
Brake shoes	21.00 to 21.50
Railroad malleable	24.00 to 24.50
Agricultural malleable	24.00 to 24.50
Country mixed	15.50 to 16.50

The Fuller-Lehigh Co., Fullerton, Pa., recently received an order from Follansbee Brothers Co. for two 42 in. Fuller-Lehigh coal pulverizers of the screen type which will be installed in its new plant at Toronto, Ohio, where the company will use pulverized coal for its sheet and pair furnaces.

British Iron and Steel Market

Reduced Output of Labor—Continental Competition—Slowing Down of Metal Working

LONDON, ENGLAND, Sept. 27.—At the time of writing a brief breathing space has been allowed in order that the coal owners and the colliers may thrash out the matter of production. Experience has shown that all labor's promises made for the purpose of getting extra wages have been broken, there being at the present time 100,000 more men employed in the pits than in 1913, with a decreased output of about 47,000,000 tons a year. This is labor's recognition of having its average wage raised from £82 a year in 1913 to £226 a year in 1920, the average pay per shift for adult male workers having increased from 7s. 1d. for 8 hr. in 1914, to 18s. 3d. in 1920 for 7 hr. The collier at the present time is working as a rule from three to four days a week, utilizing his leisure at race meetings, in motor car trips and sports generally.

The proposal now is that if the miners will do a little better than they are doing at the present moment, though considerably worse than before their wages were increased, they shall have a further addition to their remuneration ranging up to 3s., according to output. Nine men out of ten would have welcomed the strike as the first step toward bringing to an end the intolerable conditions with which employers of all grades are faced.

German Wire £50; British £80

Prices are distinctly easing down, in spite of the frantic efforts which are being made to keep them up, but continental competition is growing, and works there are underselling our makers by pounds a ton. For instance, within the last few days Belgian sheet bars have been sold to South Wales at £17 10s., c.i.f., while the nominal Welsh price is £23 10s. d/d, although sales have been made at from £22 down to £21 5s., delivered. This is more or less typical of the situation, and the demand cannot be far off when British makers will be compelled to face the situation boldly. A remarkable instance of competition in wire is afforded by the fact that German mattress wire has been sold at £50 a ton, f.o.b., compared with £80 a ton asked by British makers. These are facts which cannot be explained away.

It is common knowledge that large shipbuilding orders have been cancelled. At the meeting of Palmer's Shipbuilding Co. a few days ago, Chairman G. Mure Ritchie commented upon this cancelling, while expressing the belief that Britain could maintain its position as the premier shipbulding nation if the industry were not destroyed by labor's insatiable demands. Reports from Sunderland speak also of the cancelling of contracts, and state that the outlook for employment at the yards is very grave. There can be no question of shipbuilders building on speculation at prohibitive costs, merely in order to keep workmen employed at extravagant wages. To-day the mills of the South Durham Steel & Iron Co., at West Hartlepool, have closed down owing, it is said, to coal shortage, and short time is becoming more and more common throughout all branches of the trade.

Poor Prospects for Metal Working Trades

To add to the worries of employers the Ministry of Munitions appears to have revived itself again, and is now engaged in acrimonious correspondence with Sheffield steel manufacturers, demanding particulars of their holdings of steel on April 30, 1919, and threatening prosecutions in the event of particulars being withheld. The claim which Vickers have against the Ministry of Munitions for about £7,000,000 appears still to be unsettled, and an adjustment is in all likelihood still remote. The metal working trade appears to be on the threshold of bad times, reports from the motor industry in particular being bad, while the aeroplane works are being hit hard, and at least one big concern has shut down for good.

LOW BELGIAN PRICES

Increasing Activity in the Export Market—Rehabilitated Belgian Plants

BRUSSELS, BELGIUM, Sept. 27.—Anxiety is felt in some circles that the ambition of the Socialists to nationalize the mines and control the distribution of ore and coal may become a reality, in view of the situation in Italy.

With quotations on other materials decreasing, sheets remain firm, partly because of the heavy demand from automobile shops and manufacturers of enameled ware and partly because of numerous sales to England, where Belgian mills are quoting about 30s. less per ton than the prevailing price for domestic sheets. Sales to this market have been made at about £36 per ton for black sheets and about £43 44s. per ton for galvanized.

Prices for foundry iron quoted by Belgian producers for export are in the neighborhood of £27 10s. to £27 18s. per ton, f.o.b. Antwerp. Thomas pig iron, which has been at about 600 francs per ton, has softened to about 575 francs. The average price on heavy rails, for which there is an active export market, is 95 francs per 100 kg. Merchant bars in large sizes are generally from 98 to 100 francs, with smaller sizes correspondingly reduced, but still difficult to obtain. In the district of Charleroi mills are booking orders from the British colonies for bars at £25 to £25 10s. per ton. British buyers continue to criticize the quality of Belgian bars, claiming that they are not only inferior to the British product, but are of poorer quality than the Belgian pre-war material.

In certain lines of industrial specialties Germany is gradually returning to her pre-war position of monopoly and taking advantage of this control by charging double her domestic price for export to Belgium, France and other countries. British companies, however, are often licensed by the German manufacturers to sell for export and usually quote slightly lower prices.

The Acieries d'Angleur has relighted two old furnaces and will probably blow in two new blast furnaces before December. The Societé d'Ougrée-Marihaye has expended several million francs on reconstruction work at its plant in the Liége district, where a strike is now in progress. The Rodange works is actively experimenting on the economical use of the Basset process. The shops and rolling mills of the Glison works are now equipped for double the 1914 production.

Germany is making a great effort to obtain French ore and has made contracts with both Sweden and Spain for ore shipments. The low value of the mark, however, is proving a great obstacle.

RUSSIA BUYS LOCOMOTIVES

Orders Placed for 1000 in Sweden and 2000 in Germany at Krupp Works

George H. Steele, U. S. A. International Corporation, New York, who recently returned from a business trip to Eastern Europe and Scandinavian countries, describes conditions there as extremely bad, particularly in Soviet Russia and other countries where the radical element is active. Russia, says Mr. Steele, is in greatest need of railroad material and rolling stock and is perfectly willing to buy in gold wherever orders will be accepted. The Government recently purchased a controlling interest in Sweden in a large locomotive works and placed orders there for about 1000 locomotives. Another order for 2000 locomotives has been placed by the Russian Soviet Government with the Krupp works in Germany. The demand for railroad material is just as great.

Labor difficulties are acute in most of the countries surrounding Russia. When Mr. Steele arrived in Helsingfors, Finland, he was shown a warehouse stocked with products of the E. I. du Pont de Nemours Co.,

which had been shipped in to be sold through a Finnish subsidiary company. The stock was being held in the warehouse because of objections of the co-operative societies in Finland, who are strongly organized and oppose any effort to transact business through channels other than their own. Labor is socialistic and almost generally insists upon the 6-hr. day, so that it proves rather unprofitable to unload ships in the Finnish ports.

From his survey of the situation in Russia, Finland and Esthonia, Mr. Steele believes that the majority of the people are becoming dissatisfied with the radicals and want a more satisfactory form of government, and that with the coming of settled conditions there is a large trade open for Americans.

IRON AND INDUSTRIAL STOCKS

Market Quotations Have Averaged Higher But Net Changes Are Small

Prices quoted for iron and industrial stocks during the past week have averaged higher than they did during the previous seven days, due largely to the fact that investment money has been more in evidence of late. Then, too, the comparative stability of raw and finished iron and steel quotations served to emphasize the fact that the readjustment of industry in general has been more gradual and less drastic than anticipated in many quarters. Government figures, showing the largest corn crop on record, a wheat crop 21 per cent less than the record, yet above the average pre-war crop, and an oats crop running well above the average, have not been without influence in industrial circles.

Yet the net changes in security values is relatively small because many uncertainties regarding individual industries still exist, and to a certain extent the inclination to hold off from buying elsewhere is evident in stock market circles. The decrease of 430,234 tons in the unfilled business on the books of the United States Steel Corporation during September was about as expected. Many people appear more interested in what the Corporation will do in regard to prices than they do in the amount of business on its books.

The range of prices on active iron and industrial stocks from Tuesday of last week to Wednesday of this week was as follows:

Allis-Chalm. com.	32⅞ - 34½	Int. Har. pf.	— -107¾
Allis-Chalm. pf.	75⅛ - 75⅞	Lackawanna Steel.	61¾ - 64
Am. Can com.	32¼ - 33¼	Lake Sup. Corp.	— - 11
Am. Can pf.	85½ - 86½	Midvale Steel.	37¾ - 39
Am. C. & F. com.	132¾ -135¼	Nat.-Acme	32½ - 34
Am. C. & F. pf.	— -109	Nat. E. & S. com.	58½ - 58½
Am. Loco. com.	94⅛ - 96⅞	N. Y. Air Brake.	96½ - 97⅝
Am. Loco. pf.	101 -101¼	Nova Scotia Steel.	40 - 41
Am. Steel F. com.	36 - 38¾	Press. Steel com.	95⅞ - 97
Am. Steel F. pf.	85½ - 87⅞	Press. Steel pf.	99 -101
Bald. Loco. com.	110⅛ -113⅛	Ry. Stl. Spg. com.	95 - 96
Bald. Loco. pf.	— - 98	Replogle Steel.	78 - 79⅝
Beth. Steel com.	66¾ - 68	Republic com.	74⅝ - 77
Beth. Steel Cl. B.	68¼ - 71¼	Republic pf.	95½ - 95⅞
Beth. Stl., 8% pf.	103¾ -105	Sloss com.	63 - 65½
Case, J. I., pf.	— - 86	Superior Steel.	49 - 51
Chic. Pneu. Tool.	79½ - 80⅝	Un. Alloy Steel.	37½ - 38
Colorado Fuel.	33½ - 34⅞	U. S. Pipe com.	14⅞ - 15⅜
Cruc. Steel com.	128½ -132	U. S. Pipe pf.	— - 41½
Cruc. Steel pf.	— - 92	U. S. Steel com.	86¾ - 88½
General Electric.	137 -142	U. S. Steel pf.	107⅜ -108⅞
Gt. No. Ore Cert.	33¼ - 34⅜	Vanadium Steel.	62½ - 67
Gulf States Steel.	— - 50½	Va. I. C. & Coke.	— -112
Int. Har. com.	110 -115	Westingh'se Elec.	45½ - 47

Orders for Automobile Frames

The Ford Motor Co. has placed with the Sharon Pressed Steel Co., Sharon, Pa., an order for 25,000 steel automobile frames. The Cadillac Motor Car Co. has placed an order for 5000 frames with the same company.

No. 3 foundry of the Edgar Thomson works of the Carnegie Steel Co., in which are produced the brass castings used at the plant, established a new high record daily production mark one day last week, when 23,700 lb. were cast. The best previous daily record was 22,000 lb. in April, 1913.

Baird & Martin, Inc., 120 Liberty Street, New York, has changed its name to Baird, Lasker & Co., Inc.

REFRACTORY MARKET

Shipments Improved and Users Have Much Better Supply

PITTSBURGH, Oct. 11.—An improved supply of cars has materially helped the movement of refractories in the past couple of weeks, and it has been the experience of most of the Pennsylvania manufacturers that shipments in September were much better than they were in August. The position of the iron and steel producers in the matter of supplies is somewhat better than it was a short time ago, but at the same time few, if any, have anywhere near their normal reserves for this time of the year, and the demand still is pretty heavy. Conditions are somewhat easier in silica brick than in fire clay, for the reason that in Pennsylvania and in most other producing sections the silica brick plants are favorably located with regard to railroad service. Most of the fire clay brick plants, on the other hand, are on branch lines, and usually at considerable distances from the main lines of the railroads performing the major part of the transportation service.

Another factor in the current production of fire clay brick is the fact that the clay mines in all districts of the country are usually near coal mines, and because of the high wages being paid to coal miners at present, a considerable draft is being made upon clay mine workmen. Production of fire clay brick lately has been seriously restricted because of the scarcity of clay, incident to the exodus of the clay miners taking advantage of the greater remuneration for mining coal.

In the Kentucky districts transportation conditions remain bad, although the past week or so has seen some increase in the car placements. Most of the Illinois makers are located on the line of the Elgin, Joliet & Eastern Railroad, and have been getting good service. Missouri producers also have been able to make reasonably good shipments.

Prices show no important change from those of the past few weeks, but the market has a pretty firm undertone, and because of the high costs and the fact that most makers are sold over the remainder of the year, there is nothing to suggest any immediate recessions. A decline in the cost of coal would be helpful in reducing fire clay and silica brick producing costs. It is said that about two tons of coal are required in the manufacture of 1000 silica bricks, and 1½ tons to produce 1000 fire clay brick. Some makers of silica brick lately are reported to have paid as much as $10 and $11 per ton for coal delivered at the plants.

Some of the Western producers of silica brick have adopted the new card of extras for size and shape, but the matter still is being discussed among manufacturers in western Pennsylvania and in the East, and general adoption of the new schedules is not considered likely before Nov. 1.

We quote per 1000 f.o.b. works:

Fire Clay:	High Duty	Moderate Duty
Pennsylvania	$50.00 to $60.00	$45.00 to $50.00
Ohio	47.00 to 55.00	40.00 to 45.00
Illinois	50.00 to 60.00	40.00 to 50.00
Kentucky	50.00 to 55.00	45.00 to 50.00
Missouri	60.00 to 65.00	45.00 to 55.00
Silica Brick:		
Pennsylvania	$55.00 to $60.00	
Chicago	65.00	
Birmingham	55.00 to 60.00	
Magnesite Brick:		
Standard size, per net ton	110.00	
Chrome Brick:		
Standard size, per net ton	100.00	
Bauxite Brick:		
55 per cent per net ton	50.00	
76 per cent per net ton, base	90.00	

Sharon, Pa., plant of the Savage Arms Corporation was temporarily closed while a 16-in. air line for the furnaces was installed. The second turn at the Sharon works of the Standard Tank Car Co. has been abandoned, affecting 200 men.

The Iron Trade Products Co., Farmers' Bank Building, Pittsburgh, has secured the exclusive sales agency of the Westmoreland Gas Coal Co., with mines and coke ovens located at Madison, Pa. This company has a weekly output of about 2000 tons of coal.

Non-Ferrous Metals

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin	Lead		Zinc	
October	Lake	Electrolytic	New York	New York	St. Louis	New York	St. Louis
6.....	18.12½	18.12½	42.25	7.50	7.50	7.55	7.50
7.....	18.00	18.00	42.37½	7.50	7.50	7.50	7.50
8.....	17.75	17.75	42.25	7.50	7.37½	7.50	7.37½
9.....	17.50	17.50	....	7.50	7.37½	7.50	7.37½
11.....	17.50	17.50	41.50	7.50	7.37½	7.50	7.37½

New York, Oct. 12.

The situation in general shows no improvement, but there is an undertone of optimism as to the future. Buying of copper continues very light, with prices lower. The tin market continues exceedingly quiet. There is very little business being done in either lead or zinc, with the import situation still an influential factor. Antimony is quiet but unchanged.

To-day, Columbus Day, being a holiday in New York, the markets are closed.

New York

Copper.—At present the market is completely stagnant and has been described in one influential quarter as demoralized. Consumers are evidently waiting for the bottom and are doing scarcely any buying. Some small producers and dealers are offering their stocks at lower prices and light sales have been made as low as 17.50c., New York, which we quote as the market for both Lake and electrolytic copper. Quotations in general have been described as ranging from 17c. to 18c., which includes the larger producers. It is difficult to quote the market, there having been no fair test of the situation because of the absence of demand.

Tin.—The market continues quiet and uninteresting. The slight revival of buying by dealers, noted a week ago, has subsided and there is no demand from consumers. About a week ago one dealer made an effort to do business, but without much success. The market continues to decline, spot Straits tin being quoted yesterday at 41.50c., New York. The London market is also lower than a week ago, the quotation yesterday standing at £263 15s. for spot standard, £269 for future standard, and £265 15s. for spot Straits. In the last week on the New York Metal Exchange 25 tons of spot Straits was sold on Oct. 5 under the rule at 42c., and on Oct. 7 there were 75 tons of future shipment Straits, mostly October-November, sold at prices ranging from 43.25c. to 43.50c. Because of the holiday to-day and the downward tendency in London no business is expected until to-morrow.

Lead.—The market continues very quiet, with more metal being offered and buyers scarce. Imported lead is still available, duty paid, at 7.50c., New York or seaboard, with the St. Louis quotation on domestic lead at 7.37½c. The quotation of the leading interest continues unchanged at 7.50c., St. Louis, or 7.75c., New York. Domestic lead for prompt shipment from the West has sold at a slight concession below the price of the American Smelting & Refining Co., or equivalent to 7.70c. at some Eastern points.

Zinc.—It is estimated that the amount of prime Western zinc sold in England and contracted for for reshipment to this country amounts to around 7000 to 7500 tons. This is still a factor in the Eastern markets and establishes the quotation at about 7.50c., New York or seaboard. The domestic market has declined during the week to 7.35c. to 7.40c., St. Louis, with consumers indifferent and producers disinclined to sell except for immediate needs. An offer of 7.40c., St. Louis, for first quarter delivery proved entirely uninteresting. We quote the market at 7.50c., New York, as determined by imported metal, and at 7.37½c., St. Louis, for the domestic product. Stocks are light and production has declined.

Antimony.—Demand is light, with wholesale lots for early delivery available at 7c., duty paid.

Aluminum.—The quotation of the leading interest for virgin metal, 98 to 99 per cent pure, is unchanged at 34.90c., f.o.b. producer's mill, with the same grade from foreign sources quoted at 29c. to 30c., New York.

Chicago

OCT. 12.—All of the metals are exceedingly dull and each, with the exception of antimony, has declined under the quotations of a week ago. Current buying of copper is confined to resale material. While sellers of spelter are doing a little spot business at the present market they are disinclined to take futures at those prices. We quote Lake copper at 18.50c. in carload lots; tin, 45c. to 46c.; lead, 7.50c.; spelter, 7.50c.; antimony, 8.50c. to 9c. On old metal we quote copper wires, crucible shapes, 12c.; copper clips, 12c.; copper bottoms, 10.75c.; red brass, 12c.; yellow brass, 8c.; lead pipe, 5.50c.; zinc, 4c.; pewter, No. 1, 22.50c.; tin foil, 27.50c.; block tin, 30c.; all these being buying prices for less than carload lots.

St. Louis

OCT. 11.—The non-ferrous markets have been softer during the week with lead closing in car lots at 7.40c. bid and 7.50c. asked; spelter, 7.50c. bid and 7.75c. asked. In less than car lots the quotations were, at the close of the week: lead, 8.50c.; spelter, 8.50c.; tin, 50c.; copper, 19c.; antimony, 9c. In the Joplin ore district, ores were weak in sympathy with the metals, zinc blende, 60 per cent, selling at $40 top grade with a little at $42.50. Clamine, basis 40 per cent, sold from $33 to $35 per ton, and lead, basis 80 per cent, at $80 per ton. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 6c.; heavy yellow brass, 8c.; heavy red brass, 12c.; heavy copper and copper wire, 12.50c.; light copper, 10c.; zinc, 4c.; lead, 6c.; tea lead, 3c.; pewter, 24c.; tinfoil, 34c.; aluminum, 19c.

Refinancing Plan of Standard Parts Co.

A refinancing plan for the Standard Parts Co., Cleveland, which was recently placed in the hands of receivers, has been presented through Cyrus S. Eaton, chairman of the company's reorganization committee. Under the proposed plan, $4,500,000 of an authorized issue of $6,500,000 Class A preferred stock paying eight per cent will be issued, to be subscribed for by present stockholders to the amount of 25 per cent of their holdings and by common stockholders to an amount equal to 20 per cent of their holdings. The plan also includes the issuance of $3,000,000 eight per cent debenture stock to be underwritten by a syndicate of Cleveland investment houses. Provisions covering both stocks are to be the same except that the debenture stock is to be senior as to dividends, liquidations and redemptions. The debenture stock is to be redeemed at the rate of $300,000 par value at $110 a share each year beginning Jan. 1, 1922, and the Class A preferred stock is to be redeemed at $115 per share at the rate of $300,000 a year after the debenture stock has been redeemed.

The Preferred stockholders who subscribed shall have the right to convert into Class A stock, share for share an amount of present holdings equal in par value to 50 per cent of the amount of the new stock subscribed for. The common stockholders will have the same conversion privilege up to 30 per cent of subscription.

The reorganization committee further proposes that the board of directors of the company be reorganized and that the names for the new board be proposed by J. O. Eaton, president of the Standard Parts Co., F. H. Goff and Andrew Squire.

Polishers employed by the Westfield Mfg. Co., Westfield, Mass., bicycles, motorcycles, etc., who have been on strike for six weeks because the management refused to give an increase in wages, have returned to work. While the men were on strike their work was taken by outside concerns.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia	$0.35	St. Paul	0.695
New York	0.38	Omaha	0.815
Boston	0.415	Omaha (pipe)	0.78
Buffalo	0.295	Denver	1.35
Cleveland	0.24	Denver (wire products)	1.415
Cincinnati	0.33	Pacific Coast	1.665
Indianapolis	0.345	Pacific Coast, ship plates	1.335
Chicago	0.38	Birmingham	0.765
St. Louis	0.475	Jacksonville, all rail	0.555
Kansas City	0.815	Jacksonville, rail and water	0.46
Kansas City (pipe)	0.78	New Orleans	0.515

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver, the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in., angles, 3 to 6 in., on one or both legs, ¼ in. thick and over, and zees, structural sizes, 2.45c. to 3.10c.

Wire Products

Wire nails, $3.25 to $4.50 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of $1.50 to $2 and shorter than 1 in., $2 to $2.50. Bright basic wire, $3.25 to $4 per 100 lb.; annealed fence wire, Nos. 6 to 9, $3.25 as quoted by the American Steel & Wire Co. and No. 8 and heavier, $4 to $4.25, the range of independent makers; galvanized wire, $3.95 to $4.70; galvanized barbed wire and fence staples, $4.10 to $5.20; painted barbed wire, $3.40 to $4.60; polished fence staples, $3.40 to $4.50; cement-coated nails, per count keg, $2.85 to $4.10; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 55 to 58 per cent off list for carload lots, 54 to 57 per cent for 1000-rod lots, and 53 to 56 per cent for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets	$4.75 to $5.00 base
Large boiler rivets	4.85 to 5.00 base
Small rivets	45 to 40 per cent off list
Small machine bolts, rolled threads	40 and 5 to 25 and 10 per cent off list
Same sizes in cut threads	30 and 10 to 25 per cent off list
Longer and larger sizes of machine bolts	30 to 25 per cent off list
Carriage bolts, ⅜-in. x 6-in.:	
Smaller and shorter, rolled threads	30 and 10 to 20 per cent off list
Cut threads	30 to 20 per cent off list
Longer and larger sizes	25 to 20 per cent off list
Lag bolts	45 to 40 per cent off list
Plow bolts No. 1, 2 and 3 head	35 per cent off list
Other style heads	20 per cent extra
Machine bolts, c.p.c. and t. nuts ⅜-in. x 4-in.:	
Smaller and shorter	30 to 10 per cent off list
Longer and larger sizes	20 to 10 per cent off list
Hot pressed sq. or hex. blank nuts	$1.50 to 50c. off list
Tapped nuts	$1.00 off list
C. p. c. & t. sq. or hex. nuts, blank	list plus $1.00
C. p. c. & t. sq. or hex. nuts, tapped	list plus $1.00
Semi-finished hex. nuts, U. S. S. and S. A. E.:	
⅝-in. and larger	50 and 10 to 40 per cent off list
9/16-in. and smaller	50 and 10 to 40 per cent off list
Stove bolts in packages	60 and 10 per cent off list
Stove bolts in bulk	60, 10 and 2½ per cent off list
Tire bolts	50 per cent off list
Track bolts	7c. base
Iron cap screws	40 per cent off list
Set screws	40 and 10 per cent off list

One cent per lb. extra for less than 200 kegs. Rivets in 100-lb. kegs 25c. extra.

All prices carry standard extras f.o.b. Pittsburgh.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, $57 to $75; chain rods, $57 to $75; screw stock rods, $62 to $80; rivet and bolt rods and other rods of that character, $57 to $75; high carbon rods, $80 to $100, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, $4 to $4.25 per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, ½-in., ⅝-in. and 7/16-in., $4.40 to $5; 5/16-in., $5 to $5.75; track bolts, $7. Boat and barge spikes, $4.40 to $5 per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Tie plates, $3 to $4 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., $13.80 per package; 8-lb. coating, I. C., $14.10; 12-lb. coating, I. C., $15.80; 15-lb. coating, I. C., $16.80; 20-lb. coating, I. C., $18.05; 25-lb. coating, I. C., $19.30; 30-lb. coating, I. C., $20.30; 35-lb. coating, I. C., $21.30; 40-lb. coating, I. C., $22.30 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.35c. to 3.50c. from mill. Common bar iron, 4.75c.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld

Steel			Iron		
Inches.	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	47 to 50½	20½ to 24	⅜	15½ to 25½	+1½ to 11½
½	51 to 54½	36½ to 40	½	19½ to 29½	1½ to 11½
¾ to 3	54 to 57½	41½ to 44	¾ to 1¼	24½ to 34½	8 to 18½

Lap Weld

2	47 to 50½	34½ to 38	2	20½ to 28½	6½ to 14½
2½ to 6	50 to 53½	37½ to 41	2½ to 6	22½ to 30½	9½ to 17½
7 to 12	47 to 50½	33½ to 37	7 to 12	19½ to 27½	6½ to 14½
13 and 14	37½ to 41				
15	35 to 38½				

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	43 to 46½	25½ to 29	⅛	+17	+50
½	48 to 51½	35½ to 39	⅜	13½ to 23½	6½ to+3½
¾ to 1¼	52 to 55½	39½ to 43	½	18½ to 28½	5½ to 15½
2 to 3	53 to 56½	40½ to 44	¾ to 1¼	24½ to 34½	9½ to 19½

Lap Weld, extra strong, plain ends

2	45 to 48½	33½ to 37	2	21½ to 29½	8½ to 16½
2½ to 4	48 to 51½	36½ to 40	2½ to 4	23½ to 31½	11½ to 19½
4½ to 6	47 to 50½	35½ to 39	4½ to 6	22½ to 30½	10½ to 18½
7 to 8	43 to 46½	29½ to 33	7 to 8	14½ to 22½	2½ to 10½
9 to 12	38 to 41½	24½ to 28	9 to 12	9½ to 17½	5½ to+2½

To the large jobbing trade an additional 5 per cent. is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers have been seven (7) points lower (higher price) than carload lots and on butt and lap weld galvanized iron pipes have been nine (9) points lower (higher price).

Boiler Tubes

The following are the prices for carload lots f.o.b Pittsburgh:

Lap Welded Steel		*Charcoal Iron*	
1¾ to 1⅞ in.	+ 7 to — 19½	1¾ to 1⅞ in.	+ 20
2 in.	+ 2 to — 19½	2 in.	+ 10 to 15
2¼ to 2½ in.	3 to 30½	2¼ in.	+ 10 to 12
2¾ to 3¼ in.	11 to 30½	2½ in.	+ 1 to 10
3½ to 4 in.	20 to 40½	2¾ to 3¼ in.	— 1½ to + 3
4½ in.	40½	3½ to 4 in.	— 8 to list
		4½ in.	— 8

Standard Commercial Seamless—Cold Drawn or Hot Rolled

	Per Net Ton		Per Net Ton
1 in.	$327	1¾ in.	$207
1¼ in.	267	2 to 2½ in.	177
1⅜ in.	257	2¾ and 3¼ in.	167
1½ in.	207	4 in.	187
		4½ to 5 in.	207

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department which will be subject to special negotiations.

Sheets

Prices of the Steel Corporation for mill shipments on sheets of United States standard gage in carloads and larger lots for indefinite delivery are given in the left-hand column. For reasonably prompt delivery, mills are getting up to the prices quoted in the right-hand column:

	Cents per lb.
Blue Annealed	
No. 8 and heavier	3.45 to 5.45
Nos. 9 and 10 (base)	3.55 to 5.50
Nos. 11 and 12	3.60 to 5.55
Nos. 13 and 14	3.65 to 5.60
Nos. 15 and 16	3.75 to 5.70
Box Annealed, One Pass Cold Rolled	
Nos. 17 to 21	4.15 to 6.80
Nos. 22 to 24	4.20 to 6.85
Nos. 25 and 26	4.25 to 6.90
No. 27	4.30 to 6.95
No. 28 (base)	4.35 to 7.00
No. 29	4.45 to 7.10
No. 30	4.55 to 7.20
Galvanized Black Sheet Gage	
Nos. 10 and 11	4.70 to 7.50
Nos. 12 to 14	4.80 to 7.60
Nos. 15 and 16	4.95 to 7.75
Nos. 17 to 21	5.10 to 7.90
Nos. 22 to 24	5.25 to 8.05
Nos. 25 and 26	5.40 to 8.20
No. 27	5.55 to 8.35
No. 28 (base)	5.70 to 8.50
No. 29	5.95 to 8.75
No. 30	6.20 to 9.00
Tin-Mill Black Plate	
Nos. 15 and 16	4.15 to 7.05
Nos. 17 to 21	4.20 to 7.10
Nos. 22 to 24	4.25 to 7.15
Nos. 25 to 27	4.30 to 7.20
No. 28 (base)	4.35 to 7.25
No. 29	4.40 to 7.30
No. 30	4.40 to 7.30
Nos. 30½ and 31	4.45 to 7.35

PERSONAL

Horace S. Wilkinson, chairman Crucible Steel Co., has been elected a member of the board of directors of the National City Bank of New York to serve for the remainder of the year.

F. Rodger Imhoff, who has been located permanently in Detroit as field engineer for the Precision & Thread Grinder Mfg. Co., Philadelphia, has been appointed sales manager.

L. C. Crewe, vice-president and general manager Woodstock Operating Corporation, Anniston, Ala., was elected president and general manager of that corporation at a recent meeting of the directors. Mr. Crewe is also president and general manager of the LaFollette Coal & Iron Co., LaFollette, Tenn. S. S. Pratt, treasurer and assistant general manager LaFollette Coal & Iron Co., is also treasurer of the Woodstock Operating Corporation. C. S. Martin, Gary, Ind., has been appointed general superintendent.

Claude W. Stevens, sales department the Stanley Works, New Britain, Conn., hardware, last week was presented a gold watch as a mark of appreciation of his having completed 25 years of service with the concern.

Maj. Fred J. Miller, president American Society of Mechanical Engineers, spoke on "Experiences in Industrial Management" before the Providence Engineering Society and the Providence section, American Society of Mechanical Engineers, at Providence, R. I., Oct. 5.

Ross Cost, formerly in the efficiency department of the Southside works of Jones & Laughlin Steel Co., Pittsburgh, has become assistant manager of the railroad department of the Fuller Steel & Iron Co., Pittsburgh.

H. M. Houston, who recently severed his connection with Houston-Stanwood & Gamble Co., Cincinnati, has become associated in an executive capacity with William K. Stamets, dealer in machine tools, Jenkins Arcade, Pittsburgh.

C. T. Smith, formerly with the Chicago Pneumatic Tool Co., has joined the sales force of the National Sales & Trading Co., Cleveland, pig iron, steel, coal, coke, and will have charge of the railroad supplies department which the company has just inaugurated.

E. A. Moore, president the Stanley Works, New Britain, Conn., hardware, has returned from a three months' trip through England, France, Germany, Norway, Sweden, Denmark, Holland and Belgium to study business conditions.

William A. Hitchcock, vice-president Upson Nut Co., Unionville, Conn., has resigned after 48 years' connection with that company. His resignation will take effect at the convenience of the company. Mr. Hitchcock plans to retire from all active work.

Prescott V. Kelly, who has been assistant manager of the Prudential building sales department of the Blaw-Knox Co., Pittsburgh, has been appointed sales manager in charge of the Birmingham, Ala., office of the company, which was opened Oct. 1. The company now has eight sales offices, being also represented in Boston, New York, Detroit, Chicago, San Francisco, Baltimore and Sheffield, Eng.

C. C. Gray, formerly with the Farrar Advertising Co., Pittsburgh, has become manager of sales of the Pannier Bros. Stamp Co., Pittsburgh.

Arthur J. Wallace, who for many years prior to the war was manager of the Economic Machine Co., Worcester, Mass., is sales manager of the Metal Saw & Machine Co., Inc., Springfield, Mass., Napier metal cutting machines.

E. I. Mills, manager of the metals department of H. Allan Miller, New York, left yesterday on board the steamship La France for an extended tour throughout the principal European countries, the object of his trip being to investigate the steel situation abroad.

A. E. Murdock, foreman, tool department, Plant C, New Departure Mfg. Co., Bristol, Conn., has been made assistant manager of that plant. Previous to becoming associated with the New Departure Mfg. Co. he was in the metal testing department, Pratt & Whitney Co., Hartford, Conn.

Charles S. Dahlquist has resigned as chief engineer of the Timken-Detroit Axle Co., Detroit, to become director of engineering of the Eaton Axle Co., a division of the Standard Parts Co., Cleveland.

Herbert Higginbottom, Jr., formerly gage and tool designer Packard Motor Car Co., has joined the Arthur Knapp Engineering Corporation as assistant engineer in the Detroit office.

George F. Eldridge, B. Nicoll & Co, 149 Broadway, New York, sailed for England on the Olympic last week.

F. H. Linthicum, head of the F. H. Linthicum Bronze Foundry, Baltimore, has been appointed dean of the Drexel Institute, Philadelphia, to fill the vacancy caused by the resignation of John H. Bringhurst.

Cephas Taylor, Jr., formerly Chicago district sales manager, A. M. Byers Co., Pittsburgh, has been appointed assistant general sales manager, succeeding S. P. Broome, who retired from the company to go into the iron, steel and fuel business in partnership with H. D. Stalnaker. Myron J. Czarniecki has been named to succeed Mr. Taylor as Chicago district sales manager.

Robert Grant, Woolworth Building, New York, iron and steel merchant, has returned after an extended absence abroad.

Joseph Dussault, Chicago, has been appointed works manager of the Chippewa Foundry & Machine Co., Chippewa Falls, Wis., manufacturer of steady stream pumps. He succeeds W. W. Payne, who has become associated with the W. H. Hobbs Supply Co., Eau Claire, Wis., manufacturer and wholesaler of plumbers' and steamfitters' materials. Mr. Dussault was connected with the Kawneer Mfg. Co., Chicago, for 15 years.

L. E. Porter, Detroit resident manager S. F. Bowser & Co., tank manufacturers, Fort Wayne, Ind., has been transferred to the home office as advertising manager. He is succeeded in Detroit by W. M. Mann.

Charles F. Hauss, of the Mediterranean Trading Co., 29 Broadway, will sail for Italy on Oct. 16. For some years he resided in Milan, where he was engaged in the exporting and importing business, covering pig iron and metals among other things, and where he was president of the American Chamber of Commerce of Milan. His son, Carl L. Hauss, is the Milan member of the recently established firm of Pontecorvo, Hauss & Co., exporters and importers, Giulio Pontecorvo, consulting engineer, being the New York member of the firm.

Edward Casey, formerly associated with Kraenter & Co. and the Bethlehem Steel Co., has joined the Duff Mfg. Co. as the sales representative of its forge department, East, with offices at 50 Church Street, New York.

The V. C. Getty Co., with offices in the House Building, Pittsburgh, has been incorporated under the laws of Pennsylvania with a capital of $15,000 to do business in iron, steel, coke and metals. V. C. Getty is president of the company; I. R. Disbro, vice-president, and C. H. Wheelock, secretary. The new company takes over the business formerly conducted by Mr. Getty as an individual. The company has the exclusive sales agency of the John Harsch Bronze & Foundry Co., Cleveland, and has opened offices in Cleveland and in Chicago. The Cleveland office is located in the Hippodrome Building, and is in charge of I. H. Disbro, while the Chicago office is in the Standard Savings & Trust Building, with C. H. Wheelock in charge.

The C. B. Roberts Engineering Co., Boston, capitalized at $300,000, has been granted a Massachusetts charter to do a general engineering, construction and managing business. Claude B. Roberts, 1871 Commonwealth Avenue, Boston, is president and treasurer. Henry C. Drown, 81 Newell Road, Newton, is assistant treasurer. Frederick G. Ring, Brookline, and Charles W. Hussey, Newton, are directors.

OBITUARY

CHARLES H. DOMHOFF, former member of the Domhoff & Joyce Co., pig iron, coke and coal, Cincinnati, died at the Gibson Hotel, Cincinnati, where he made his home, Oct. 5, at the age of 67. He began his career as office boy for Addy, Hull & Co. in 1870. Subsequently Mr. Addy bought out Mr. Hull and at that time Mr. Domhoff was taken in as a junior partner. He remained in the management of the office of Matthew Addy & Co. until 1895, when he retired from that firm. On Feb. 1, 1896, he organized the Domhoff & Joyce Co. with T. J. Joyce and John Sargeant, president and treasurer of the present firm, as his associates. Mr. Domhoff continued in full control and active management of the company until 1909, when he retired from business. However, he continued to make his headquarters at the office of the company and took an active part in the management until his death. He had the high respect of Cincinnati business men.

C. H. DOMHOFF

HENRY ARNOTT CHISHOLM, former president Chisholm Shovel Co., Cleveland, died in Yokohama, Japan, on Sept. 28, while on a tour of the Orient. He retired from the presidency in November, 1919, being succeeded by his son, A. T. Chisholm. He was graduated from Harvard in 1874, and then entered the plant of the Cleveland Rolling Mill Co. In 1877 he and his father affiliated with the shovel works, he becoming manager. At his father's death the company was incorporated as the William Chisholm's Sons Co., with Henry A. Chisholm as president. He was also a director of the Union Steel Screw Co., and later a director in the National Screw & Tack Co., which absorbed the former company.

CHARLES H. GRAHAM, who for many years was associated with the Upson Nut Co., Unionville, Conn., died at his home in Thompsonville, Conn., Oct. 1. He was born at New Britain, Conn., Oct. 15, 1837. He went to work for the Upson Nut Co. as a factory hand, but subsequently rose to be shipper, superintendent and treasurer, holding the last position until a few years ago, when he retired. In addition he was secretary of the Union Nut & Bolt Co., New York and Chicago, and assistant treasurer of the Union Rolling Mill, Cleveland. Mr. Graham invented and patented an automatic lathe for threading bolts. He married Miss Emeline A. Upson, daughter of Seth and Martha Brooks Upson, who died in 1906. He is survived by three sons, Walter E., who until last summer was associated with the Upson Nut Co.; Samuel F., superintendent Unionville branch, Upson Nut Co., and Henry C., Cleveland, a member of the firm of the Bourne Fuller Co., which recently purchased the Upson Nut Co.

PATRICK NOBLE, president Pacific Rolling Mill Co., San Francisco, died in Stanford Hospital recently at the age of 71. He was born in Abbeville, S. C., in 1849, and was a member of the Charleston College, class of 1868. He fought with the Confederate army at the age of 16. Three years later he went to San Francisco at the time the Pacific Rolling Mill Co. was being formed. He started as clerk and rose to the managership. At the company's reorganization in 1898 he became president. His son, Edward B. Noble, is vice-president of the Pacific Rolling Mill Co.

GEORGE RAHMANN, founder of George Rahmann & Co., leather belting manufacturers, New York, died Sept. 30. He started the company in 1895 and until two years ago had been active in its further development. His work will be carried on by his son, Arthur H. Rahmann, who has been with the company over 20 years.

CHARLES H. ALBERT, general superintendent F. J. Greene Engineering Works, Racine, Wis., died Sept. 30 at the age of 63 years. He was connected for 25 years with S. Freeman & Sons Mfg. Co., Racine, manufacturer of boilers, tanks, stacks, etc., and shortly after the Greene company was established in 1904 was appointed superintendent.

ELVIN L. MCGREW, aged 55 years, purchasing agent and general traffic manager Standard Underground Cable Co., Pittsburgh, died in the Hotel Imperial, New York, Oct. 8. His home was in Crafton, Pa. He was a director of the Purchasing Agents' Association of Pittsburgh and was the first president of that organization. His connection with the Standard Underground Cable Co. dated back to 1900.

Malleable Foundries Running at About 50 Per Cent of Capacity

The regular monthly meeting of the Western members of the American Malleable Castings Association was held in Columbus, Ohio, Oct. 6, taking place in that city instead of Chicago, owing to the fact that many of the members were in attendance at the annual meeting of he American Foundry Association. The session was devoted almost wholly to the discussion of trade conditions and reports generally indicated that practically no change has developed in the malleable iron industry during the past few weeks. The plants are running at about 50 per cent of capacity and foundries that make automobile castings have not yet had orders released that were recently held up. Collections are very slow.

Foundries engaged in making railroad castings are fairly well filled with work and some of the foundries that cater to the agricultural implement manufacturers reported some improvement in their orders. Competition for agricultural implement castings has resulted in price concessions by a few foundries. However, the general view of the trade is that as long as material prices stay at present levels, particularly the prices on fuel, there can be very little concession in prices on malleable castings. Some of the manufacturers of fire brick have advised foundrymen that they may advance prices on fire brick Oct. 15.

Trumbull Stock Subscription Plan

Trumbull Steel Co., Warren, Ohio, has offered 80,000 shares of common stock for subscription by employees on a deferred payment basis at $27.50 per share. Par value of the stock is $25 and its current market quotation is around $30.50. The subscription privilege commenced Sept. 25 and will continue until Oct. 9. Payments are deducted from subscribing employee's wages and may be made as low as $1 per month per share. Dividends will be credited to stock subscribed for until it shall have been paid and five per cent interest per annum will be charged on the unpaid balance. In addition to the regular dividends, bonus dividends will be paid on employees' stock at the rate of 4 per cent Jan. 1, 1922; 6 per cent Jan. 1, 1923; 8 per cent Jan. 1, 1924, and 10 per cent Jan. 1, 1925, on original certificates. No extra dividend will be paid on more than 100 shares to one person. In event of a common stock dividend during the life of the subscription, subscribers' stock will participate.

In case of subscriber's death before stock is paid for and while subscription is still in force, the remaining obligation will be cancelled and the stock delivered to the legal representatives of the deceased. This provision does not apply to more than 100 shares and bonus dividends will not be paid on stock so delivered. The subscription may be cancelled by the company or by the employee in case he leaves the company's service, in which event settlement may be made either in cash or stock at the option of the company. Subscription for 40,000 shares, or one-half the offering, would bring the total common stock issued or subscribed for to $13,500,000. Officials state there has been a generous response to the offer.

WILL HAMPER RAILROADS

Decision Expected to Cause Long Delays in Making Government Payments

WASHINGTON, Oct. 12.—Delays in payment of money due the railroads from the Government for losses during the six months guaranty period, which followed the return of the roads to private control, will be caused as a result of a far-reaching ruling by Comptroller of the Treasury Warwick. Under the ruling, the Treasury will make no partial advances, if applied for subsequent to Sept. 1 when the guaranty expired, until a complete adjustment of the guaranty account for any particular railroad in question is made. It is estimated that of approximately $600,000,000 due the railroads under the guaranty section of the transportation act, about $150,000,000 already has been paid in the form of advances against estimated deficits. The ruling held that advances made prior to Sept. 1 were proper, but that no applications for partial advances could be honored after that date.

The effect of the ruling will be to hamper the railroads in their purchase of equipment and supplies. In many cases, the advances were desired in order to pay back wages which have fallen due under the Labor Board award.

The ruling was made in the case of the Grand Trunk Western Railway Co., and the Detroit, Grand Haven & Milwaukee Railroad Co. The former applied for $500,000 and the latter for $250,000, certificates for the advancement of these amounts have been issued by the Interstate Commerce Commission.

"I think that it is quite clear that the law does not give to the carrier the right to file its claim piecemeal and to have certificates for payment made by the commission without limit as to number or time," said Mr. Warwick relative to claims filed after Sept. 1.

"The needs of certain carriers for funds is recognized, but this office may not construe the law to authorize the payment of public money except in such amounts and at such times as Congress has authorized by law, no matter how urgent the needs of claimants."

LOWER PRICES EXPECTED

Decline in Quotations on Coke and Coal Looked for in the Mahoning Valley

YOUNGSTOWN, OHIO, Oct. 11—Because of the undercurrent of feeling that coal and coke prices may weaken at any time, thereby reducing iron production costs, possibilities of lower pig iron prices are anticipated. The spot coal market, sustained by export demand, remains at $10.50, while spot coke is quotable at $17. There is imminence of price declines in both fuels, large industrial consumers believe.

Indications multiply that a more active market exists for a number of products, chiefly black sheets, pipe and wire products. Because of more active competition from Belgian and German steel interests and lower prices quoted by British manufacturers, there is anticipation among district constituents of the Consolidated Steel Co., export agent for a number of leading independents, that there will be a considerable scaling in premium export prices, which will more closely approach quotations on domestic shipments.

A number of sizable export inquiries for black sheets have entered the Mahoning Valley in the past week, directed chiefly at the newer producers, who have been engaged to a large extent on premium business. Buying interests evidently anticipate a chance to secure deliveries of tonnage available by reason of cancellations. One such maker, however, reports that the best he can do on deliveries is December on either black or full finished sheets. Meanwhile shipments are being made to automobile builders in fairly large volume, despite the lull in the automobile trade.

District scrap dealers are experiencing a slump in demand which appears to be general, with consuming interests well covered. Though heavy melting steel is quoted at $28 to $28.50, one important scrap interest entered into a contract to supply this grade to a large independent at $27.50.

Substantial tonnages of plate ends are being shipped from this territory to the Orient.

Connellsville Conditions Improved

UNIONTOWN, PA., Oct. 12.—Production in the Connellsville region during the past week shows some increase over the output during the preceding week. Car supply showed improvement while the labor situation, which is affected from time to time, especially around pay days, by intoxication among the workers, was improved also.

The coal and coke market, while soft, showed no really material changes during the week. Coke quotations are $17 and $17.50. Coal quotations are $10.50 for Pool 34, B. & O.; $10.00 for by-product; $9.75 to $10 for pool 34 coal on the B. & O.; lake coal, $7.50.

Prospects for the coming week for cars are better. Information has reached here that 1500 cars from the East are to be provided the Monongahela division of the Pennsylvania daily.

There is an impression in coal and coke circles that prices are on the verge of a break—but so far there has been no substantial indication of any change.

Steel Corporation's Orders Decrease

Unfilled orders on the books of the United States Steel Corporation Sept. 30, were 10,374,804 tons, compared with 10,805,038 tons on Aug. 31. This is a decrease of 430,234 tons, against one of 313,430 tons in August, an increase of 139,651 tons in July, 38,352 tons in June, 580,718 tons in May, 467,672 in April, 389,994 tons in March, 216,640 tons in February and 1,020,075 tons in January. The unfilled tonnage a year ago was 6,284,638 tons, or 4,090,166 tons less. The table below gives the unfilled tonnage at the close of each month beginning with January, 1917:

	1920	1919	1918	1917
Jan. 31...	9,285,441	6,684,268	9,477,853	11,474,054
Feb. 28...	9,502,081	6,010,787	9,288,453	11,576,697
March 31.	9,892,075	5,430,572	9,056,404	11,711,644
April 30..	10,359,747	4,800,685	8,741,882	12,183,083
May 31...	10,940,465	4,282,310	8,337,623	11,886,591
June 30..	10,978,817	4,892,855	8,918,866	11,383,287
July 31...	11,118,468	5,578,661	8,883,801	11,844,164
Aug. 31..	10,805,038	6,109,103	8,759,042	10,407,049
Sept. 30..	10,374,804	6,284,638	8,297,905	9,833,477
Oct. 31...	.....	6,472,668	8,353,293	9,009,675
Nov. 30..	.....	7,128,330	8,124,663	8,897,106
Dec. 31...	.....	8,265,366	7,379,172	9,381,718

The largest total of unfilled orders was on April 30, 1917, when it was 12,183,083 tons. The lowest was on Dec. 31, 1910, at 2,605,747 tons.

Extending Pipe Line

PITTSBURGH, Oct. 12.—To provide against a possible shortage of natural gas this winter, the Carnegie Steel Co. is extending the 40-in. pipe line which now conveys by-products gas from Clairton to the Duquesne works, to its Homestead works. The connection will be made at Brierly Farms, back of Homestead. It is expected that the works will be completed in about five to six weeks.

The Wholesale Equipment & Supply Co., sales agent of mill, foundry, railroad, mine equipment and supplies, has opened an office at 1002 Farmers Bank Building, Pittsburgh, intending very shortly to establish others in Birmingham and Chicago. D. R. Sterrett, formerly purchasing agent James H. Matthews & Co., Pittsburgh, is president. Associated with him is S. F. McLeod, for many years purchasing agent Duluth, Missabe & Northern Railroad.

Machinery Markets and News of the Works

REVIVAL HOPED FOR

Several Factors Indicate Sluggish Business Until the New Year

A New England Builder Reduces 15 Per Cent—More Guarantee Against Price Cutting

In the absence of present business the trade is speculating as to when the expected revival will begin. This is generally placed after the beginning of the new year, as is borne out by a canvass of machine tool builders attending the foundrymen's convention at Columbus last week. They believe that a large number of past inquiries, temporarily withdrawn, will be revived at that time, when the election is over, annual inventories are taken and the financial situation may be better. It is also believed that by that time the railroads will have been compelled by force of necessity to buy much more equipment; also the automotive industry should have been readjusted after the wave of price-cutting.

More machine tool builders are guaranteeing against price cutting. In Cincinnati, however, there are no reports of guarantees. Builders there, though, do not expect any cuts before spring, by which time high priced stocks of raw material will have been exhausted. There they will reduce operating forces rather than manufacture for stock. One or two dealers in Chicago have shaded prices to move stock. A reduction of 15 per cent on internal grinding machines has been made by Churchill-Morgan-Crittsinger, Inc., Worcester, Mass.

The Pere Marquette has bought $100,000 worth of tools for shops at Saginaw, Plymouth and Grand Rapids, all in Michigan. The Brazil Railway has issued a list of 125 machines, 58 of which are engine lathes. The Air Reduction Co., New York, has inquired for a dozen tools, orders for which are expected this week.

Considerable activity prevails in New England. The General Electric Co. has issued a list of 23 tools for the experimental department at West Lynn, Mass. The Consolidated Mica Co., Lynn, Mass., will probably close this month on 16 machine shop requirements. Thirty-nine Hendey lathes were recently contracted for, 30 by the Western Electric Co., Chicago and nine for the Government Vocational Training School, Atlanta, Ga.

Twelve electric steel foundries in Milwaukee have agreed to close alternately one day a week to conserve electric power. Another Eastern plant has gone on a 4-day week schedule.

New York

NEW YORK, Oct. 11.

While the condition of machine-tool trade presents many discouraging features, it cannot be said that tool manufacturers and their representatives are wholly pessimistic. It is generally conceded that very little improvement is to be expected over the remainder of the year. The first of the year has been fixed in the minds of many as the point at which improvement in business will become manifest. While this expectation is largely a psychological condition, there are some arguments advanced as to why the machine tool trade will not long remain in a state of doldrums. One of these is that the Presidential election will soon be a thing of the past, and the other is the belief that railroad purchases cannot be postponed much beyond the first of the year. Another factor is the belief that the automobile industry, having got selling prices down partially toward a pre-war level, has passed through the worst feature of its depression, and that with a gradual improvement in automobile buying these manufacturers will again come into the market for shop equipment.

In the East the largest suspensions of orders for machine tools have come from the Willys Corporation, Elizabeth, N. J., which recently sent out instructions to machine-tool manufacturers to hold up all standard tools not already shipped. As work on the factory buildings of the Willys Corporation is proceeding without interruption, it is believed in the trade that eventually these orders will be reinstated.

The principal source of satisfaction to the local machine-tool trade is that there are many pending inquiries. Although most of these have been held up indefinitely, the cause of the hold-ups, in many instances, is lack of cash with which to make purchases, together with some uncertainty as to whether machine-tool prices will be maintained at present levels. When confidence in values has been restored the trade looks for a resumption of buying, and it is a general belief that this renewal of activity is not more than four or five months off at the most.

There have been no further developments in the price situation except a reduction of 15 per cent in the prices of internal grinding machines by Churchill-Morgan-Crittsinger, Inc., Worcester, Mass., formerly the Worcester Machine Works. Sellers are being asked more frequently to guarantee prices, and in a majority of instances this request is being willingly complied with.

The Air Reduction Co., New York, has inquired for 10 or 12 tools for an experimental shop, and orders are expected this week. The Barber Asphalt Paving Co., which has inquired for about $50,000 worth of tools for a machine shop near Perth Amboy, N. J., recently destroyed by fire, has deferred purchases, but probably not for long.

Export business is exceedingly quiet, but there have been fair sales of tools for Japan, and a large list of shop equipment for the Brazil Railway is now being figured on. This list contains about 58 engine lathes and other miscellaneous tools, about 125 machines in all. This is believed to be real business, though actual buying may not be done for two or three months.

Those who have been following up the railroads closely believe that no important railroad buying in the East will be done before Jan. 1. The Baltimore & Ohio and Erie railroads have fairly large lists, which have not received the approval of the finance departments. The Virginian Railway is expected to issue a list of its requirements some time within the near future, but there is a great deal of uncertainty about all railroad buying. The railroad purchasing departments appear to be in the dark also as to when their buying will begin.

Manufacturing operations at machine tool plants continue to show reductions. Another Eastern plant has gone on a four-day week, and numbers of others have reduced working hours.

While there is little activity in crane purchases, there is a fairly large volume of new inquiries, particularly for export. The Amoskeag Mfg. Co., Manchester, N. H., has not yet closed for the 60-ton crane inquired for recently.

Among current sales are: Heyl & Patterson, a 3-ton, half arch revolving jib crane to the New York State Barge Canal Commission for Erie Basin Terminal; Milwaukee Electric Crane & Mfg. Co. a 5-ton, 42-ft. span overhead traveling crane to the Federal Shipbuilding Co., Kearny, N. J.; Champion Engineering Co., a 5-ton, 26-ft. 6-in. span overhead traveling crane to the Metal & Thermit Corporation, Chrome, N. J., a 20-ton, 72-ft. span, 4-motor overhead traveling crane to the Corrugated Bar Co., Buffalo, N. Y., and a 5-ton, 50-ft. span overhead traveling crane to the Magnolia Petroleum Co., Beaumont, Texas.

The John J. Riley Co., Inc., Van Brunt Street, Brooklyn, manufacturer of iron and brass castings, has rejected all bids for its proposed addition. Revised plans will be prepared and new bids asked before the end of the year. The extension will be two and three stories, on Columbia Street, and is estimated to cost $250,000 with equipment. It will be used primarily for the manufacture of castings for marine service.

The Utica Valve & Fixture Co., Utica, N. Y., manufacturer of valves and metal specialties, has increased its capital from $25,000 to $750,000.

The Fort Lee Ferry Garage Co., 619 West 129th Street, New York, is completing plans for a two-story service and repair building on Moylan Place, 120 x 260 ft., to cost about $250,000.

The New York Thread Grinding Co., 182 Worth Street, New York, has filed notice of dissolution under state laws.

The C. R. S. Mfg. Co., New York, has been incorporated with a capital of $500,000 by W. M. Cronk, J. B. Roberts and W. C. Strabelle, 2 East Fiftieth Street, to manufacture elevator equipment and mechanisms, parts, etc.

The Eastern Engineering & Construction Co., 1 Dominick Street, New York, J. A. Almarell, head, has taken bids for its new one-story plant on Van Dine Avenue, Glendale, L. I., to cost about $80,000.

The Greene-Wolf Co., 30 Church Street, New York, iron and steel products, has increased its capital from $20,000 to $100,000.

The Borough Park Garage, Inc., 1434 Forty-ninth Street, Brooklyn, has completed plans for a four-story brick service and repair building, 91 x 100 ft., at Fourteenth Avenue and Thirty-eighth Street, to cost about $100,000.

The Poldi Steel Corporation of America, New York, has been incorporated with an active capital of $50,000 by R. M. Overlander, B. F. Norris and M. H. Weiss, 165 Broadway, to manufacture iron and steel products.

The Greenlie-Halliday Co., 499 Water Street, New York, manufacturer of machine stud bolts, nuts, washers, etc., has increased its capital from $50,000 to $150,000.

The A. C. Chesley Co., 277 Rider Avenue, New York, manufacturer of hollow metal and metal covered doors, is considering the erection of a new two-story brick plant, 50 x 210 ft., on property recently acquired on 132nd Street, to cost about $100,000.

The Memco Engineering & Mfg. Co., New York, has been incorporated with a capital of $100,000 by R. A. Sandt, M. P. Maxwell and H. A. Hall, 162 University Avenue, to manufacture hardware products and machine equipment.

The General Electric Co., 120 Broadway, New York, has acquired property on Grand Avenue in the Bushwick section, Brooklyn, formerly occupied by the United Button Co., for the establishment of a branch plant. The factory comprises about 100,000 sq. ft., and was secured for $500,000.

The National Dairy Equipment Co., Utica, N. Y., has been incorporated with a capital of $200,000 by H. M. Towart, F. D. Courtenay and J. K. Byard, to manufacture dairying machinery and farm equipment.

The Nomora Sales Corporation, New York, has been incorporated with a capital of $250,000 by A. F. Stillman, N. E. Benjamin and H. J. Edwards, 30 Church Street, to manufacture electrical devices and apparatus.

The Universal System of Electric Alarms, Inc., New York, has been incorporated with a capital of $500,000 by V. R. Modern, W. G. Andrew, and O. M. S. Greaves, 130 Claremont Avenue, to manufacture electrically operated signal devices.

The Whyt Enamel Specialty Co., Brooklyn, has been incorporated with a capital of $50,000 by N. H. Henning, A. Scheinfeldt and A. Wyse, 325 Central Park West, New York, to manufacture enamelware.

The Jenkins Elevator Co., New York, recently organized, will operate a plant at 221-27 Canal Street for the manufacture of elevator equipment. A repair department will be included. Donald V. Jenkins, formerly chief engineer for the Watson Elevator Co., New York, heads the company.

The Victor X-Ray Corporation, 131 East Twenty-third Street, New York, recently organized, will be closely associated with the General Electric Co., Schenectady, N. Y., and the x-ray business of the latter will be merged with the Victor interests. The main office and plant will be at Chicago, comprising in part the former works of the Victor Electric Corporation, West Jackson Boulevard and Robey Street. C. F. Camms, formerly president of the Victor Electric Corporation, will be president of the new company, which will operate under a New York charter, with active capital of $246,000.

The Westinghouse Electric & Mfg. Co., 165 Broadway, New York, has acquired the International Radio Telegraph Co., 326 Broadway, and in the future will manufacture the wireless apparatus produced by the latter company. A new company will be formed under the same name as the acquired interest, with capital of $1,250,000. The Springfield, Mass., plant of the Westinghouse company will be conducted as a special works for the manufacture of wireless equipment. Guy E. Tripp, chairman of the board of the Westinghouse company, will occupy a similar office with the re-organized International company.

The Chelsea Elevator Co., New York, manufacturer of elevator equipment, has removed its plant from 212 West Twenty-sixth Street to 439-41 West Nineteenth Street, where larger quarters will be provided.

In connection with harbor developments at Staten Island, the New York Harbor Commission, Murray Hurlbert, commissioner of docks, will install considerable mechanical equipment for freight handling, comprising cranes, monorail tracks and cars, elevators for motor truck transfer to different levels, hoisting machinery, etc.

The Nitol Motor Products Co., Highland Park, N. J., has been incorporated with a capital of $125,000 by Ferdinand D. Schussler, Charles M. MacWilliam and A. E. Latham, to manufacture automobile parts and equipment.

The Florence Foundry Co., Florence, N. J., has awarded a contract to L. M. Shertack, 826 Arch Street, Philadelphia, for a two-story foundry, 55 x 100 ft., to cost about $50,000.

The Westinghouse Lamp Co., Bloomfield, N. J., is considering plans for an addition to its plant in the Watsessing district.

Plans for the proposed addition to the plant of the National Lock Washer Co., 65 Johnson Street, Newark, N. J., manufacturer of washers and other metal products, are being prepared by the Fletcher-Thompson Co., Inc., engineer, 1089 Broad Street, Bridgeport, Conn.

The Interstate Metal & Refining Co., 29 Commercial Street, Newark, has had plans prepared for a one-story metal-working shop, at Plum Point Lane and Harkins Avenue, to cost about $15,000.

The New York Auto Top & Supply Co., 262 Halsey Street, Newark, is having plans prepared for a new one-story and basement plant at Broad and Astor streets, 63 x 118 ft., to cost about $40,000. Backoff, Jones & Cook, 9 Clinton Street, are architects.

The H. & F. Brass Foundry, Tiffany Park, Newark, has filed plans for a new one-story, brick foundry to cost about $16,000.

The Graphoscope Mfg. Co., 49 Mechanic Street, Newark, N. J., manufacturer of scientific instruments, has increased its capital from $100,000 to $150,000.

The International Body Corporation, Newark, recently incorporated in Delaware with capital of $1,000,000, will operate a plant at 97 New Jersey Railroad Avenue, in a building purchased from Gould & Eberhardt, manufacturer of machine tools. Arrangements have been perfected for early production by the International company. Thomas C. Burke is secretary and Gustav A. Ortmann, treasurer.

The Ford Motor Co., Lincoln Highway, Kearny, N. J., is planning to increase the output at its assembling plant from 375 to about 475 automobiles per day.

The Rubber & Celluloid Products Co., 56 Ferry Street, Newark, has filed plans for a one-story machine shop.

Charles A. Hones, Inc., manufacturer of Buzzer automatic blast gas soldering furnaces, burners and special appliances, has removed from 91 Noble Street, Brooklyn, N. Y., to Baldwin, L. I.

New England

BOSTON, Oct. 11.

Local interest centers largely in a new list of 23 tools, including four 12-in. x 6-ft., three 14-in. x 6-ft. and four 14-in. x 8-ft. lathes, horizontal and vertical milling and boring machines, gear cutters, grinders, shapers and radial drills, issued by the General Electric Co., West Lynn, Mass., for its experimental department. This list is somewhat of a surprise, as it was intimated that no additional equipment would be bought for some time following its recent purchases for its new Western Massachusetts subsidiary. This, together with the semi-official announcement by the Manomet Mill, New Bedford, Mass., that it will close on its list of about 16 machine shop requirements before the end of October, has had a favorable effect on the trade here. The Consolidated Mica Co., Lynn, Mass., which will locate in quarters now occupied by Charles Brostrom, on Washington Street, has purchased one 5500 lb. and five smaller punch presses and one small second-hand press. The Bassett Machine Works, East Milton, Mass., has bought a number of used Pratt & Whitney milling machines, profilers and multiple spindle drills, in addition to the Porter Cable lathes, reported last week. The Western Electric Co., Chicago, has contracted for 30 Hendey lathes, and the Government Vocational Training School, Atlanta, Ga., for nine. Practically

all other business transacted the past week has been for single tools.

The number of companies guaranteeing prices against a decline during the next six months is increasing. One Middle Western maker of wood-working machinery, whose prices have been indefinite, has sent out a new list showing an advance of approximately 10 per cent as compared with the last prices issued in March, 1920. Stock sheets of some makers of metal-working machines, for the first time in many months, disclose a moderate accumulation, but deliveries on certain kinds of equipment, notably lathes, are still considerably extended, in a number of instances to March and April, 1921. No cancellations of importance by New England users are reported, and cancellations from other sections of the country are fewer. Some companies, however, have abandoned purchases of machine tools, probably the most important being the Dennison Mfg. Co., Framingham, Mass., paper goods, which is using its appropriation for shop equipment for another purpose. New England machine tool makers, generally, have sufficient business on their books to keep operating the remainder of the year, and a Worcester, Mass., manufacturer of planers, is operating day and night shifts. There are exceptions, however, and in some cases a few hundred machinists have been laid off.

The Franklin Foundry Co., Franklin, Mass., will move to Hyde Park, Boston, in the near future, where it is constructing a foundry 60 x 62 ft. on East Glenwood Avenue. A No. 20 Paxton cupola is being installed.

The Spencer Screw Corporation, 262 Liberty Street, Springfield, Mass., heretofore occupying the top floor in the Hampden Brass Co.'s plant, is moving into the front part of the building, where it will have 50 per cent more floor space. The Hampden Brass Co. is utilizing the space vacated for a new machine shop for machining brass castings and is in the market for equipment.

The Liberty Mfg. Co., Stratford, Conn., which recently increased its capitalization from $250,000 to $3,000,000, is completing the first unit of its plant in which 4- to 12-cylinder air-cooled motors will be made. When completed, there will be four two-story, 200x400 ft. units and approximately 700 machinists will be employed. Joseph S. Lach, Milford, Conn., for some time connected with the Locomobile Co. of America, Bridgeport, Conn., is president.

The construction of the one-story, 40x100 ft. machine shop contemplated by the H. & B. American Machine Co., Ltd., Pawtucket, R. I., textile machinery, has been postponed until spring.

The Whitted Higgins Co., Providence, has been granted a Rhode Island charter to manufacture machines and tools. The incorporators are Henry S. Whitted, Dorchester, Mass.; John S. Higgins, Winchester, Mass., and Edward G. Fletcher, Providence, R. I.

Because of a slowing up of the automobile business and the consequent demand for electric starting equipment, the Westinghouse Electric & Mfg. Co., East Springfield, Mass., is planning to devote more attention to the manufacture of wireless outfits.

The Bassett Machine Works, East Milton, Mass., contemplates the erection of a new machine shop next spring.

The Franklin Machine & Tool Co., Springfield, Mass., valve grinders, hereafter will market its product. Heretofore the grinders were sold by the Franklin Sales Co., Holyoke, Mass. The company is placing on the market a new attachment for grinding breaker points.

Contract has been let for a one-story, 90x100 ft. addition to the foundry of the Vulcan Iron Works, New Britain, Conn.

The American Brass Co., Ansonia, Conn., in addition to a new one-story 333x400 ft. hot rod and copper wire mill, is to construct a one-story, 336x400 ft. plant.

Plans are being figured on the erection of a two-story, 57x123 ft. garage for the Conroy Motor Co., Worcester, Mass. A machine and repair shop is included.

A one-story addition, 60x148 ft., is being built to the plant of the Worcester Foundry Co., Inc., Worcester, Mass.

The Revere Rubber Co., Providence, R. I., has awarded contract for a two-story addition, 25x125 ft., to its plant.

Foundations are in for the one-story, 121x160 ft. factory for the Walker & Pratt Mfg. Co., Watertown, Mass. It will be used for the manufacture of gas stoves.

Plans are being drawn for the Fiske Rubber Co., Chicopee Falls, Mass., for the erection of a factory at Jewett City, Conn.

The Stanley Steel Wheel Co., Boston, is about to start construction on a one-story plant at Tonawanda, N. Y.

The Wollaston Foundry Co., Norfolk Downs, Quincy, Mass., has purchased a controlling interest in the Ross Machine Co., Quincy.

The Improved Paper Machine Co., Nashua, N. H., is building a three-story addition, 40x40 ft., to be used as an erecting department.

The American Tube Works, Somerville Avenue, Somerville, Mass., has completed plans for a one-story, brick and steel addition to cost about $75,000.

The Greenfield Tap & Die Corporation, Sanderson Street, Greenfield, Mass., manufacturer of thread cutting tools, has arranged for a preferred stock issue of $2,255,000.

The Colonial Brass Works, New Britain, Conn., has been incorporated with a capital of $50,000 by A. G., C. J., R. J., and E. T. Carlson, 57 Griswold Street, to manufacture brass, bronze and other metal products.

The Rubber Regenerating Co., Elm Street, Naugatuck, Conn., has filed plans for a one-story machine shop addition, and extensions and improvements in other buildings to cost about $50,000.

The Starr Brass Foundry, Worcester, Mass., has filed notice of organization to operate a plant at 128 Exchange Street for the manufacture of brass, bronze and other metal castings. William A. and Philip A. Latour head the company.

The General Electric Co., Lynn, Mass., has awarded a contract to the Langan & Shaw Construction Co., 80 Boylston Street, Boston, for a one-story addition to its plant, 180 x 250 ft., with three ells, 40 x 40 ft., 15 x 40 ft., and 12 x 20 ft., to cost about $150,000. It is stated it will hold in abeyance plans for its proposed five-story plant at Springfield, Mass., and will call for bids in 1921. The structure will be 75 x 400 ft., and is estimated to cost in excess of $500,000.

The Lynnway Aircraft Corporation, Lynn, Mass., has been incorporated with a capital of $100,000 by Thomas F. Hennessey, Linwood W. Tracey and James Wilkins, to manufacture airplanes and parts.

The Laconia Car Co., 60 Congress Street, Boston, with plant at Laconia, N. H., has disposed of a note issue totaling $700,000, to provide for needed expansion and working capital. The company is said to have orders on hand aggregating $1,800,000, and sufficient to insure full production for the next eight months.

The Quincy Ornamental Iron Works, Boston, has been organized to manufacture ornamental iron and similar products. Thomas W. Doud and Daniel F. Stevens, 138 Milk Street, head the company.

The General Service Corporation, Waterbury, Conn., has been incorporated with a capital of $100,000 by Arthur Zimmerman, G. E. Towie and W. F. McGinness, all of Waterbury, to manufacture metal products.

The Winera Machine & Mfg. Co., Cliftondale, Mass., has been incorporated with a capital of $50,000 by Ralph S. and Nelson E. Power, Cliftondale, and Gardner B. Fassett, Beverly, to manufacture machinery and parts.

The Franklin Foundry Co., Franklin, Mass., is arranging for the removal of its plant to Hyde Park, near Boston, and construction has begun on a building, 60 x 62 ft., on East Glenwood Avenue. Exclusive of equipment it will cost about $16,000. Frank Gibbons is head.

The International Steel Toy Co., Boston, has been incorporated with a capital of $100,000 by Arthur C. Pearce, Brookline, and Laurence A. Charlton, Brighton, to manufacture steel and metal toys, novelties, etc.

Philadelphia

PHILADELPHIA, Oct. 11.

Thomas Mills & Brother, Inc., Eighth and Thompson streets, Philadelphia, manufacturer of bakers' and confectioners' supplies, has awarded a contract to the John R. Wiggins Co., Otis Building, for the erection of a two-story addition, 24 x 68 ft., to cost about $20,000.

J. C. Hadik, 2430 North Fairhill Street, Philadelphia, has filed plans for a one-story addition to his machine shop.

A one-story power plant, 30 x 100 ft., will be erected by the Reyburn Mfg. Co., Twenty-third and Allegheny streets, Philadelphia, in connection with its new tag and label works, estimated to cost in excess of $250,000.

S. W. Evans & Son, 4623 Paul Street, Philadelphia, manufacturer of metal products has filed plans for a one-story building at 4622 Lasher Street.

The Eastern Wheel & Rim Co., Philadelphia, has been incorporated with a capital of $50,000 to manufacture automobile wheels and rims. W. M. Jarvis, 2049 North Carlisle Street, is treasurer.

The Staybestos Mfg. Co., 5534 Lena Street, Philadelphia, manufacturer of brake linings for automobile service, has acquired property at Germantown Avenue and Apsley Street, 168 ft. wide by irregular depth, as a site for its new plant.

Contract for erection was recently let to R. M. Peterson, 5114 Germantown Avenue. It will be two-story, 60 x 150 ft., instead of 50 x 70 ft., as previously announced, and is estimated to cost $60,000.

The Crouse-Hinds Co., Philadelphia, manufacturer of condulets and other electrical products, with plant at Syracuse, N. Y., has moved its local headquarters from the Franklin Trust Building to the Otis Building, where larger space is provided.

The Abrasive Co., James and Fraley streets, Philadelphia, manufacturer of grinding wheels and abrasive products, has increased its capital from $1,000,000 to $1,250,000.

The Frid Engineering Co., Philadelphia, has been incorporated with a capital of $100,000, to manufacture mechanical specialties. E. M. Frid, 2320 Sansom Street, is treasurer.

The Gasser Mfg. Co., Trenton, N. J., recently incorporated with a capital of $500,000 has established temporary offices at 402 Greenwood Avenue, and has plans under way for its proposed plant for the manufacture of special hoists, operated without chains or cables, and portable aid and electrically-operated brushes and other equipment. The factory will be one-story 100 x 100 ft., and is estimated to cost about $85,000. Joseph Gasser is president. W. A. Klemann, First National Bank Building, is architect.

The Ewing Rubber Co., Hillcrest, near Trenton, N. J., recently incorporated with a capital of $100,000 to manufacture rubber products, will occupy the former plant of the A. F. Updike Rubber Co., Homan and Hilton avenues, which has been dissolved. The same officials are identified with the new company, including Archibald F. Updike and James Schultz.

The Arrow Auto Signal Mfg. Corporation, Trenton, N. J., has been incorporated with a capital of $200,000 by C. A. Rose, 227 East Front Street; John Erdie and John Mikulas, to manufacture signal apparatus for automobile use, metal specialties, etc.

The board of directors, Hare's Motors, Inc., has approved consolidation plans for the Mercer Motors Co., Trenton, N. J., and the Locomobile Co., Bridgeport, Conn., under the name of the acquiring company. The merger will affect only the manufacturing branch of the organizations. The net assets of the two companies exceeds $11,000,000. Under the plan, the Simplex Automobile Co., New Brunswick, N. J., taken over by the Mercer company in the spring, automatically becomes part of the new arrangement.

The MacAndrews & Forbes Co., Camden, N. J., will make extensions and improvements at the one-story power plant to cost about $150,000, including equipment.

The Coast Refrigerating Facilities, Inc., Atlantic City, N. J., has been incorporated with a capital of $400,000 by H. H. Jennings, George S. Brooks and William C. Marshall, to manufacture refrigerating machinery and apparatus.

The Bath Portland Cement Co., Bath, Pa., has increased its capital from $700,000 to $910,000. It has plans under way for extensions and improvements in the power house and department at its local plant to cost about $200,000.

The Graham Roller Bearing Co., Coudersport, Pa., has been incorporated with a capital of $335,000 to manufacture ball bearings, roller bearings and other metal products. Fletcher Goodwill, 11 West Fifth Street, Jamestown, N. Y., is treasurer.

The Schwartz Motor Truck Co., Chestnut Street, Reading, Pa., manufacturer of automobile trucks, has preliminary plans under way for the first unit of its proposed new plant at Oakbrooke, to comprise a one-story works, 90 x 440 ft., estimated to cost about $250,000, including machinery. H. B. Schwartz is president.

The Gasco Mfg. Co., Lancaster, Pa., has been incorporated with a capital of $50,000 to manufacture metal products. R. W. Shreiner, Lancaster, is treasurer.

The Scranton Electric Co., Scranton, Pa., has arranged for a bond issue of $1,000,000, the proceeds to be used in part for extensions and improvements in its power plant and system. R. E. Breed is president.

The Weidman & Mohr Machine Co., Lancaster, Pa., has been incorporated with a capital of $300,000 by James B. Weidman, Charles A. Mohr and W. M. Murphy, to manufacture machinery and tools, including electrical apparatus.

The fourth floor of the new service and automobile plant now being erected at Chestnut and Howard streets, Allentown, Pa., will be equipped as a machine and repair shop, including department for parts manufacture. The structure is owned by the Wink Motor Co., and will be four stories, steel and concrete. It is expected to be ready for occupancy at an early date.

The Allen Tire & Rubber Co., Allentown, Pa., manufacturer of automobile tires, has filed plans for the second unit of its new plant at Bachman Terrace, 60 x 130 ft., and estimated to cost $70,000.

The Edison Electric Co., Lancaster, Pa., and the Harrisburg Light & Power Co., Harrisburg, Pa., have plans under way for the erection of a new hydroelectric power plant on the Susquehanna River, Convoy Township, Lancaster County. The proposed plant will be constructed jointly; it will have a maximum generating capacity of about 100,000 kilowatts, and is estimated to cost about $3,000,000 complete. A new company will be formed by officials of the two interests to carry out the project.

Pittsburgh

PITTSBURGH, Oct. 11.

Little activity is noted in the machine-tool market in this district, although some inquiries are coming out. Sales are confined largely to individual tools from dealers' stocks. Railroad buying of machine shop equipment almost is nil. The general lack of sales is ascribed in most quarters to the uncertainty over the immediate future of prices, created by deflation in credits. Local dealers note much improvement in deliveries from Cincinnati against old orders. Representatives of crane manufacturers have been asked frequently by steel companies in the past few weeks for approximate prices for estimating purposes, but it will take some time before these companies will be ready to issue specifications. Crane awards recently noted were two 5-ton and one 10-ton, and a 3-ton, 2-motor, monorail hoist placed by the Bessemer Gas Engine Co., Grove City, Pa., with the Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., and a 10-ton overhead crane placed by the Nickle Plate Foundry Co., Cleveland, with the Euclid Crane & Hoist Co., Euclid, Ohio. It is expected the Bessemer Gas Engine Co. will soon be in the market again for a number of cranes. The A. Garrison Foundry Co. has not yet closed against its inquiry for five cranes.

The Hammond Iron Works, Warren, Pa., manufacturer of boilers, tanks, etc., has increased its capital from $200,000 to $600,000.

The Iron City Tin & Enameled Ware Co., Pittsburgh, is being organized by F. B. Gardner, Robert H. Leitch and Louis F. Adelman, 919 Park Building, to manufacture enameled, galvanized, aluminum, tin and other specialties. Application will be made for a State charter.

A one-story power house to cost about $70,000 will be constructed by the Pittsburgh Cut Flower Co., 116 Seventh Avenue, Pittsburgh, at its works at Bakerstown, Pa. Fred Burke is president.

Samuel and Benjamin Hausman, and J. J. Goldsmith, Frick Building, Pitttsburgh, are organizing the S. Hausman & Sons Co., to manufacture machinery, and other iron and steel products. Application has been made for a State charter.

The Pittsburgh Generator Co., Pittsburgh, has increased its capital from $50,000 to $300,000.

The International Nickel Co., 43 Exchange Place, New York, with plant at Bayonne, N. J., will break ground about Nov. 1 for its new plant at Huntington, W. Va. It has about 75 acres on the Guyandotte River, and the new works are estimated to cost in excess of $3,000,000.

The Pittsburgh Steel Supply Co., Pittsburgh, is being organized by C. D. Beistel, W. J. Lappe and E. K. Hagen, care of Wright, Chalfant & McCandless, Frick Building, to manufacture iron and steel products, etc.

The West Virginia Rail Co., Huntington, W. Va., has plans under way for an addition aggregating about 25,000 sq. ft. and to cost about $50,000. Harry Zeller is president.

The Wickman Screw Works, Pittsburgh, has been incorporated with a capital of $50,000 to manufacture screw machinery, parts, etc. H. M. Wickersham, 141 North Avenue, is treasurer.

The New River Coal Co., McDonald, W. Va., is taking bids for a new one-story, brick and steel plant, including machine shop, to cost about $200,000 with equipment.

The Connellsville By-Products Coal Co., Morgantown, W. Va., recently organized with a capital of $5,000,000, is planning for the installation of electrically operated machinery for mining and other operations. Stephen Arkwright is manager.

The Ohio River Steel Foundry Co., New Cumberland, W. Va., has been incorporated with a capital of $350,000 by Thomas Heyward and Carlton Hughes, Pittsburgh, and Alexander Sweeney, Millville, W. Va., to manufacture iron and steel castings.

Chicago

CHICAGO, Oct. 11.

The Pere Marquette has bought about $100,000 worth of machine tools for its Saginaw, Mich., Plymouth and Grand Rapids shops. About half of this business was placed through Detroit dealers. No further purchases have been made by the Santa Fe, and the Chicago & Northwestern and the Illinois Central lists are still pending. Aside from railroad orders, little business is developing. Buyers are evidently waiting for reductions in prices and a few of them have asked for guarantees against declines as a condition precedent to placing orders, but notwithstanding this attitude manufacturers' quotations on tools remain unchanged. It is reported that one or two dealers have shaded prices to move stocks, but sellers as a whole refuse to take this step because it would force them to bear the concession which, to be at all impressive on the buyer, would more than wipe out the commission on the sale. Collections are still difficult, but cancellations have probably been smaller in this district than in sections further east where automobile orders have constituted a larger proportion of total sales. Shipments from builders are steadily improving and transportation conditions are now causing little trouble.

The board of education, Joliet, Ill., has bought three engine lathes and other equipment for the high school.

Building in this city during September showed a decided slump, both in comparison with figures for August and for September of last year. The decrease for the period as against the month a year ago was 70.55 per cent. Building permits were issued in September for 291 structures, fronting 9439 ft. and involving a cost of $3,970,000, as against 654 buildings fronting 21,512 ft. and costing $13,483,600 in September, 1919, and 308 structures fronting 10,752 ft. and costing $5,521,000 in August of this year.

The Dryden Rubber Co., manufacturer of mechanical rubber goods, 1014 South Kildare Avenue, Chicago, is constructing two additions, one three-story and the other one-story, at a cost of $450,000.

The Waltham Motors Corporation is remodeling a plant it recently bought from the Victor Truck & Trailer Co., 401-417 North Hoyne Avenue, Chicago, at a cost of $84,000. The company also plans to build a two-story office and factory building, 100 x 150 ft., to cost $80,000.

The Typewriter Emporium, 34 West Lake Street, Chicago, and the Lightning Coin Changer Co. have leased the plant of the Independent Button Machine Co., 92 x 162 ft., Ravenswood Avenue and Montrose Boulevard.

The Universal Machine & Tool Corporation, 4146-52 West Taylor Street, Chicago, has completed plans for a new two-story building at the northeast corner of Fullerton and Kenton avenues, to be 65 x 225 ft., and to cost $150,000. The company expects to move into its new quarters by Jan. 1.

The Walker Axle Co., a comparatively new concern, controlled by the Commonwealth Edison Co. interests, Chicago, has engaged George C. Nimmons & Co., architects, 122 South Michigan Avenue, to prepare plans for a one-story machine shop and a two-story office building to be erected at Eighty-seventh and State streets.

The McIntosh Battery & Optical Co., 217-223 North Desplaines Street, Chicago, has let contracts for a one and two-story plant, 120 x 125 ft., at 223-233 North California Avenue, to cost $45,000. Excavation was begun Oct. 6.

The International Harvester Co., 606 South Michigan Avenue, Chicago, has had plans made for the first unit of a plant for manufacturing trucks at Ft. Wayne, Ind., to comprise eight buildings and to cost $5,000,000. Day & Zimmerman, Philadelphia, are the architects.

The Advance Spring & Wire Co., manufacturer of coiled springs for upholstery for furniture and automobiles, 1749 Carroll Avenue, Chicago, has had plans made by Ralph E. Stretzel, 431 South Dearborn Street, for a two-story annex, 120 x 123 ft., but has postponed erection until next spring. Cost, $125,000.

The William Siebert Co., manufacturer of cafeteria fixtures, La Grange, Ill., is asking for bids through an architect on a one-story addition, 85 x 112 ft. and 29 x 40 ft., to cost $12,000.

The E. A. Baumbach Mfg. Co., 810 West Lake Street, Chicago, is receiving bids on a one-story foundry, 50 x 150 ft., Kilbourn Avenue and Sixteenth Street, to cost $15,000.

The American Wall Bed Co., 1444 West Twenty-first Street, Chicago, will rebuild its plant recently destroyed by fire. The structure will be 50 x 71 ft. and will cost $20,000.

The International Harvester Co., 606 South Michigan Avenue, Chicago, has let a contract for a one-story foundry addition, 50 x 200 ft., 1748 Fullerton Avenue, to cost $8000.

The Illinois Malleable Iron Co., 1801 Diversey Boulevard, Chicago, has let a contract for a one-story plant, 40 x 75 ft., 2826 North Paulina Street, to cost $7000.

Anton J. Groene, East Moline, Ill., for a number of years with the Chicago, Rock Island & Pacific Railroad, has purchased the Streator Boiler Works, Streator, Ill.

The Eclipse Lawn Mower Co., Prophetstown, Ill., will construct a plant, 125 x 160 ft.

The Anderson Foundry & Machine Works, Anderson, Ind., contemplates erecting a machine shop addition, 80 x 300 ft.

The Electric Machinery Co., Fourteenth Avenue Northeast and Taylor Street, Minneapolis, Minn., has filed a voluntary petition in bankruptcy.

The Blackmer Rotary Pump Co., Petoskey, Mich., will increase its capital stock from $100,000 to $200,000.

The Ryan-Bohn Foundry Co., Lansing, Mich., has completed a foundry, 300 x 528 ft.

The C. G. Stevens Iron Works, 33 South Jefferson Street, Chicago, is planning a one-story building, including power plant, on Western Avenue and Forty-fifth Street, to cost about $75,000.

The Burdett Oxygen & Hydrogen Co., Chicago, manufacturer of industrial oxygen, etc., has increased its capital from $210,000 to $600,000.

The Perfection Tire & Rubber Co., Fort Madison, Ia., manufacturer of automobile tires, has arranged for a note issue of $1,000,000.

The Johnson Gas Appliance Co., Cedar Rapids, Ia., has broken ground for a one-story and basement plant addition, near Sixth Street, 55 x 86 ft. W. G. Haskell is head.

The City Council, Wellington, Kan., is having plans prepared for a municipal electric power plant, to cost about $60,000. Johnson & Benham, Firestone Building, Kansas City, Mo., are engineers. L. A. Walton is city clerk.

Buffalo

BUFFALO, Oct. 11.

The Buffalo Machine & Foundry Co., 1543 Fillmore Avenue, Buffalo, has awarded a contract to B. I. Crooke, Niagara Life Building, for a one-story foundry addition, 38 x 80 ft., to cost about $17,000. Another contract was recently awarded for a two-story addition, 50 x 70 ft., to cost $25,000.

Considerable electrical and mechanical equipment will be installed at the new plant to be erected by the International Paper Co., Buffalo Avenue, Niagara Falls, N. Y., estimated to cost about $75,000. It will also make improvements and extensions in its plant at Ticonderoga, N. Y., to cost about $20,000.

The Glenmore Co., Lima, Ohio, operating a local oil refining and compounding plant, has acquired property at Buffalo, for the erection of a branch plant, and it is proposed to begin construction at an early date and the company has arranged for a bond issue of $100,000 for this purpose. It will double the present output.

The A. J. Deer Co., West Buffalo Street, Hornell, N. Y., manufacturer of coffee mills, and other iron and metal products, has increased its capital from $250,000 to $500,000.

The Diepress Co., Cazenovia, N. Y., has increased its capital to $130,000.

A bond issue of $10,000,000 has been arranged for distribution in the United States by Solvay & Cie, operating in Belgium, France, Spain and Italy, affiliated with the Solvay Process Co., and the Semet-Solvay Co., Syracuse, N. Y. The proceeds will be used for plant expansion, working capital and general financing.

With the acquisition of a large interest in the Locke Insulator Co., Victor, N. Y., by the General Electric Co., Schenectady, N. Y., it is said that operations will be discontinued at Victor, and that the main plant of the company will comprise the works now being erected at Baltimore, Md. The Symington-Hoffman Co., Baltimore, is also interested in the company.

The Stanford-Crowell Co., West Seneca Street, Ithaca, N. Y., manufacturer of metal advertising signs, novelties, etc., has increased its capital from $78,000 to $250,000.

The Massey-Harris Harvester Co., Batavia, N. Y., and the affiliated Canadian company, the Massey-Harris Co., Ltd., have arranged for a joint bond issue totaling $4,000,000. The two companies are operated under one management, with Thomas Findley, president.

The Clay Cutlery Co., Andover, N. Y., manufacturer of knives, cutlery, etc., has arranged for the erection of an addition.

The Peugeout Co. of America, Colgate and Hopkins streets, Buffalo, has awarded a contract to the Hydraulic Steelcraft Co., Cleveland, for a new one-story plant, 120 x 460 ft., for the manufacture of automobile parts and other automotive products.

The Commercial Machine Co., Inc., hardened and ground machine work, automobile camshafts, Dunkirk, N. Y., has in-

creased its capital to $50,000 preferred and 750 shares of common stock, no par value. It has taken over another local shop in Dunkirk, having a floor space of 7000 sq. ft. It is also erecting a new building 46 x 155 ft. to be ready for use before the first of the year. The three plants will then be devoted to the manufacture of motor camshafts, hardened and ground motor parts, mufflers and power cultivators. Additional equipment will be purchased. The officers of the company remain as for the past six years.

Indiana

INDIANAPOLIS, Oct. 11.

The Holten Tractor Co., Indianapolis, manufacturer of motor-driven tractors, has increased its capital from $500,000 to $2,000,000.

The Link Belt Co., Belmont Avenue, Indianapolis, has filed plans for its new one-story plant, 70 x 340 ft., to cost about $65,000.

The Stewart Wire Wheel Co., Frankfort, Ind., is having plans prepared for the erection of a two-story factory, 60 x 85 ft., to cost about $75,000.

The National Mfg. Co., Rushville, Ind., has been incorporated with $20,000 capital stock to manufacture farm implements. The directors are George A. Looney, Don C. Brooks and W. S. O'Neal.

The Board of School Commissioners, Indianapolis, is considering bids for a power house and shops for the Arsenal Technical School. The lowest bids for construction and equipment total $1,176,678.

The Rutenberg Motor Co., which recently sold its plant at Marion, Ind., to the Velie Motor Co., Moline, Ill., has bought the works of the American Chain Co., West Marion. It will manufacture automobile parts and motors.

The factory of the O. K. Giant Battery Co., Gary, Ind., was destroyed by fire Oct. 6 causing a loss of $100,000.

The Corwin Electric Co., Lafayette, Ind., has been incorporated with $10,000 capital stock to manufacture telephone and electrical devices. The directors are Elmer E. Corwin, S. M. Johnson and William Stone.

The Keystone Foundry Co., Plymouth, Ind., has increased its capital stock from $10,000 to $50,000.

The Ansted Spring & Axle Co., Connersville, Ind., has filed final articles of dissolution.

The Stocky Specialty Co., Evansville, Ind., has been incorporated with $25,000 capital stock to manufacture automobile parts. The directors are Adolph Stocky, F. W. Bicking, E. H. Schaerges, Charles Byers and Frank Spangler.

Milwaukee

MILWAUKEE, Oct. 11.

Machine tool trade continues quiet, with only a small run of orders in a scattering way. The usual sources of business display no interest under existing conditions. Railroad inquiry is fairly active and a few sales are being made from time to time, but this channel is not yet free. The automotive industries are not buying, save for the most urgent needs, which generally are for replacement.

Foundries are beginning to feel the effects of the curtailment of production, especially in the gas engine and automobile trade. However, no decided cut has been made in schedules. The electric steel foundries are reducing operations owing to the acute shortage of current at the principal central source. Twelve shops of this character have agreed to alternate in closing one day a week to conserve the supply of current.

The Kone Klutch Corporation, LaCrosse, Wis., has been incorporated with a capital of 2000 shares of non-par value common stock, to manufacture clutches and other transmission units and parts for motor vehicles and general industrial uses. The incorporators are C. S. Cone, G. O. Stoffer and George W. Bunge.

The Jefferson Rubber Co., Jefferson, Wis., has been granted a charter to manufacture tires, tubes, belting and other rubber and composition rubber articles. The capital stock is $300,000. The Jefferson Realty Co., capitalized at $75,000, has been formed by the same interests to finance the construction and equipment of a new plant, which is to be ready to commence regular production by May 1, 1921. The incorporators are William F. Copeland, Edward F. Schultz, Joseph Eiden, A. W. Heileman and O. H. Shepard.

The Interstate Coal & Dock Co., Green Bay Wis., has been granted authority to increase its capital stock from $150,000 to $300,000 to increase its coal handling and storage capacity from 50 to 100 per cent.

The Turner Mfg. Co., Port Washington, Wis., founder, machinist and manufacturer of gas engines, tractors, etc., has decided to defer until next spring new plant construction and equipment to cost about $100,000. Plans prepared by Frank D. Chase, Inc., Chicago, will be withdrawn temporarily. W. A. Engelhart is general manager.

The Interstate Mfg. Co., 2907 Meinecke Avenue, Milwaukee, metal products and appliances, has changed its corporate style to Simplicity Products Mfg. Co.

The Henry W. Horst Co., 105 Wells Street, Milwaukee, has taken the contract for the construction of a new proving ground at Savanna, Ill., for the Ordnance Department, United States Army, which will cost about $2,500,000. Materials and equipment are now being purchased.

The Nelson Timer Co., Milwaukee, has been organized with capital of $15,000 to manufacture timers and other ignition devices for gas engines. The promoters are represented by Chris Steinmetz, Jr., attorney, 425 East Water Street.

The Common Council of Hartford, Wis., has authorized the Board of Education to secure plans and specifications for a new high school, including a junior high school and vocational training institute. It will be of brick and concrete, four stories, 130 x 300 ft., and cost about $425,000. Work probably will begin early next spring. H. A. Sawyer is chairman of the board.

Detroit

DETROIT, Oct. 11.

The local machine-tool market is stationary, little or no activity being reported.

The Jacox Steering Gear Plant, which was closed six weeks, and the engine plant, which was closed three weeks, now are operating with about 50 per cent of the normal working force.

The Ford Motor Co. is moving its tractor plant from Dearborn, Mich., to new buildings at River Rouge, Mich., near the Ford blast furnaces and it is expected that operations will begin before the end of the month. The tractor plant has been employing 4500 of whom 1500 will remain in the experimental plant to be maintained in Dearborn. While no verification has been received, it is believed that the Dearborn plant will be enlarged for manufacture of the Ford internal combustion engines for street and interurban cars.

The LeRoy-Brochm Foundry Co., Detroit, recently organized, has begun operations at 932 East Jefferson Avenue. It specializes in brass castings.

The new $1,000,000 machine shop of the General Motors Truck Co., Pontiac, Mich., was completed last week and equipment valued at more than $1,000,000 is being installed. The plant has a total floor space of 170,000 sq. ft.

A one-story foundry and office building has been contracted for by the Brass Products Co., 1067 East Palmer Avenue, Detroit. Construction will start immediately.

Contract has been let for a factory and warehouse for the Crane Co., Rivard and Franklin streets, Detroit.

The Roto Pump Mfg. Co., Detroit, has been organized by William L. Ruttledge, 1600 McLellan Avenue, and others with a capital stock of $50,000, for the manufacture of pumps and accessories.

The General Tool & Engineering Co., Detroit, has increased its capitalization from $10,000 to $100,000, and plans improvements and additions.

The Blackmer Rotary Pump Co., Petoskey, Mich., has increased its capitalization from $180,000 to $280,000.

The General Spring & Wire Co., Detroit, is having plans prepared for a new one-story, brick and steel plant, 200 x 250 ft., at Fort Street and Oakwood Boulevard, to cost about $175,000. C. L. Clark is secretary.

The Monarch Foundry Co., Detroit, has increased its capital from $50,000 to $100,000.

The Hood Motor Truck Co., 200 East Grand Boulevard, Detroit, is considering plans for new motor truck works at Monroe, Mich. W. C. Hood is president.

The Muskegon Motor Specialties Co., Muskegon, Mich., has increased its capital from $400,000 to $600,000.

The Model Body Corporation, Detroit, manufacturer of automobile bodies, has increased its capital from $25,000 to $60,000.

The Atlas Iron & Steel Co., Detroit, has been incorporated with a capital of $200,000 by J. W. Bass, 135 Peterboro Street; Raymond T. Harrison and Herman Batts, to manufacture iron and steel products.

The C. R. Wilson Body Co., Clay Street, Detroit, manufacturer of automobile bodies, is planning to rebuild the portion of its plant recently destroyed by fire. The new structure, including equipment, is estimated to cost about $200,000.

The Universal Utilities Corporation, Alpena, Mich., has perfected plans for increased capacity and proposes to enlarge its working force from 140 to 200 operatives. It specializes in the manufacture of electrically-operated washing machines.

The Michigan Lubricator Co., Detroit, manufacturer of lubricating devices, has increased its capital from $200,000 to $1,000,000.

The Ross-Evans Tool Co., Detroit, has changed its name to the Diamond Tool & Engineering Co.

Cleveland

CLEVELAND, Oct. 11.

A canvass of machine tool manufacturers at the exhibits of the American Foundrymen's Association in Columbus last week indicates that few look for much revival in the machine tool market until after the first of the year, but the general feeling is that a good demand for machinery will develop then. Manufacturers and dealers have a good volume of inquiries on which nothing has been done and think that a large share of these will be revived after the financial situation is improved, election is over and the annual inventories are taken. Locally the market continues very dull with nothing developing in the way of orders and inquiries for more than one or two machines.

The Rickersberg Brass Co., Cleveland, is planning a foundry addition.

The Clay Engine Co., Cleveland, is considering the erection of a one-story factory, to cost $50,000.

The Window Tool Co., 1565 East Seventeenth Street, Cleveland, is considering the erection of a one story addition, 48 x 130 ft.

The Austin Co., Cleveland, has taken a contract for the new plant of the Columbiana Boiler Works, Columbiana, Ohio, including two buildings, 80 x 120 ft., and 60 x 80 ft.

The Keagy & Lear Co., Coshocton, Ohio, now operating a machine shop, is erecting a foundry, 46 x 146 ft.

The Hale Electric Heater Co., Cleveland, has completed negotiations with the Chamber of Commerce, Massillon, Ohio, to locate in that city and will establish a plant for the manufacture of electric heating equipment for houses.

It is reported from Marion, Ohio, that the Alloy Steel Casting Co., Warren, has acquired property in that city formerly used for foundry purposes, and will equip it for foundry operations.

The Lima Foundry & Machine Co., Lima, Ohio, has commenced the erection of its new plant.

The K-D Carburetor Co. and the Eagle Carburetor Co., Marquette Road, Cleveland, have acquired one of the factory buildings recently occupied by the Guide Motor Lamp Co. West 115th Street and Madison Avenue. The Guide company recently moved into a new plant.

The Marsh Auto Accessory Co., Norwalk, Ohio, is planning a one-story factory, 40 x 80 ft.

The Ladel Mfg. Co., New Philadelphia, Ohio, is planning a foundry, 88 x 300 ft.

The Warren Metallic Bed Co., Warren, Ohio, will erect a plant, the first unit to be 90 x 440 ft.

Cincinnati

CINCINNATI, Oct. 11.

The machinery market continues dull, although some fair sales have been made, but mostly for replacement or for rounding out equipment. Some lathes have been sold to the oil country in the Southwest, but this business is not as heavy as a few months ago. Railroad buying is small although a few scattered tools are being purchased. Reports of price cutting have been current the past week, but local manufacturers state that they do not see lower prices in sight before spring, or until the high priced materials now in stock are used up. While it is reported that some manufacturers of other districts are guaranteeing prices against declines, local builders state they have given no definite guarantee and feel sure that prices will remain at present levels for many months. Shops continue to maintain their operating schedules but in a number of cases production has about caught up with orders and it is expected that working forces will be reduced rather than make machines for stock.

The Cincinnati Auto Spring Co., Cincinnati, is in course of formation to manufacture automobile and wagon springs. It is negotiating with the Cincinnati Chamber of Commerce for a lease and it is expected that all details will be completed and the company in operation about the first of the year. Foreign interests are said to be behind the company.

The Precision Die & Tool Co., Cincinnati, recently incorporated, has awarded to John Wyckoff, contract for a plant, 40 x 70 ft., at the intersection of Colerain Avenue, and the Baltimore & Ohio Railroad. W. W. Franklin and Robert Crowe are the architects.

The Delaware Brass Co., Delaware, Ohio, has been incorporated with a capitalization of $125,000 by G. W. Fisher, S. F. Fisher, R. E. Fisher and S. L. Fisher.

The Research Engineering Co., Dayton, Ohio, has been organized with a capitalization of $200,000 to manufacture a moderate-priced air-cooled automobile. The inventor of the motor is O. H. Spencer, who is also president of the company.

The Cambridge Foundry & Machine Co., Cambridge, Ohio, will begin the immediate construction on a one-story addition, 80 x 120 ft.

The Wagner Mfg. Co., Sidney, Ohio, manufacturer of enamelware products, etc., has plans under way for a one-story foundry addition, 80 x 180 ft., to cost about $75,000.

The National Drawn Steel Co., East Liverpool, Ohio, has completed plans for a new one-story building, 100 x 170 ft., to cost about $65,000.

The Williams Mfg. Co., London, Ohio, manufacturer of steel wool, etc., has filed plans for a new one-story plant, 50 x 175 ft., to cost about $45,000.

The Great Western Tire & Rubber Co., Centerville, Ohio, has awarded a contract to B. S. Staley & Sons, Centerville, for the erection of a one-story plant, 80 x 400 ft., to cost about $85,000.

The Herring-Hall-Marvin Safe Co., Hamilton, Ohio, has filed plans for the erection of its proposed new three-story plant, 92 x 105 ft., to cost about $100,000.

The Hoppes Mfg. Co., Belmont Avenue, Springfield, Ohio, manufacturer of water purification equipment, has completed plans for the erection of a two-story addition, 45 x 78 ft.

Baltimore

BALTIMORE, Oct. 11.

The A. Weiskittel & Son Co., Twelfth and Lombard streets, Baltimore, manufacturer of stoves, ranges, etc., has awarded a contract to E. Eyring & Son, 3501 Fait Avenue, for a one-story foundry addition, 32 x 40 ft., to cost about $25,000.

The Tucker-Parthree Electric Co., 122 Hollingsworth Street, Baltimore, has been incorporated with a capital of $50,000 by Francis Tucker, Clarence E. Parthree and I. T. Parks, Jr., to manufacture electrical products.

The Spann Motor Co., 3125 Philadelphia Avenue, Baltimore, has arranged a list of machine tools and equipment for installation at its new two-story machine and automobile repair shop, estimated to cost about $25,000.

The Consolidated Gas, Electric Light & Power Co., Lexington Building, Baltimore, has arranged for the immediate razing of structures on property at 501-29 East Madison Street, and has plans under way for the erection of a new power plant on the site.

The Nest-A-Drum Co., 1231 Calvert Building, Baltimore, has been organized to manufacture metal drums and knock-down, collapsible barrels. William H. Hamilton and Walter H. Cook head the company.

The McNamara Brothers Co., Inc., Kloman Street, Westport, Md., manufacturer of boilers, tanks, etc., is taking bids for its one-story addition, 80 x 200 ft., to cost about $25,000.

The J. H. Miner Saw Mill Mfg. Co., Columbia, S. C., manufacturer of saw-mill machinery, will build a one-story addition.

The Fruit Growers' Express, Alexandria, Va., operating car repair shops, has arranged for an addition on North Washington Street, to be used for new car construction. It is proposed to develop a capacity of about five complete refrigerator cars per day and will give employment to about 300 men, or twice the present force.

McKee, Williams & MacIntire, 225 Twenty-eighth Street, Newport News, Va., have plans under way for a new two-story automobile service and repair works, 100 x 100 ft.

A. L. Flint, general purchasing officer, Panama Canal, Washington, D. C., will receive bids up to 10:30 a. m., Oct. 26, for machine tools, pumps, steel and copper cable, brass chain, and other mechanical apparatus for the Panama Canal Zone.

The Harding Peeling Machine Co., 37 South Liberty Street, Baltimore, has been incorporated with $50,000 capital stock to manufacture canning machinery, etc. The incorporators are Robert E. Post, Frederick W. Claybrook and Homer Hurst.

The South Baltimore Harbor & Improvement Co., Fidelity

Building, Baltimore, has been granted a permit for a two-story foundry, 16 x 39 ft., at Pennington Avenue and Blossom Street, Curtis Bay, Baltimore.

The Cambridge Wire Cloth Co., Cambridge, Md., has increased its capital stock from $20,000 to $50,000.

The Globe Shipbuilding & Dry Dock Co., Fairfield, Baltimore, has made application for a permit to build four one-story buildings to cost about $10,000.

The General Elevator Co., 428 East Saratoga Street, Baltimore, contemplates remodeling its plant. George R. Zorn is in charge.

The Stone Towing Co., Wilmington, N. C., plans the construction of a marine railroad and the establishment of shops.

The Central South

ST. LOUIS, Oct. 11.

The Walsh & Weidner Boiler Co., Chattanooga, Tenn., has completed plans for several additions to its plant, to replace temporary existing structures. It recently increased its capital from $300,000 to $700,000 for expansion.

The Nashville Industrial Corporation, Nashville, Tenn., submitted the highest bid to the Government for the purchase of the Old Hickory powder plant, near Nashville, at a price of $9,050,000. It consists of 5000 acres and represents an investment of $100,000,000. Upon acquisition, the new owner will divide the site for occupancy by a number of industries.

The Norman Sheet Metal Mfg. Co., Nevada, Mo., manufacturer of metal ceilings, etc., has filed plans for a one-story addition, 110 x 188 ft. W. F. Norman is president.

The Tennessee Stove Works, Chattanooga, Tenn., has increased its capital from $100,000 to $150,000.

The Elk Creek Coal Co., Knoxville, Tenn., is planning for the installation of electrical machinery at its coal properties near Blackey, Ky. L. J. Madden, Blackey, is engineer and manager.

The Frankfort Elevator & Coal Co., Frankfort, Ky., has acquired an existing building for the establishment of a shipbuilding plant. An equipment list is being prepared.

The Lenoir City Car Works, Lenoir City, Tenn., has plans under way for an addition for the production of brass journals, engine bearings and kindred equipment.

A two-story building, 80 x 100 ft., to be equipped as a rotary room and operating department will be erected by the Crescent Paper Co., 413 North Second Street, St. Louis. With equipment it will cost about $100,000.

The Continental Car Co. of America, Louisville, has increased its capital from $500,000 to $1,150,000.

The Ford Motor Co., Detroit, is taking bids for the erection of a four-story and basement addition to its service plant on Third Avenue, Louisville, 100 x 250 ft.

The Peerless Carbon Co., Guthrie, Okla., is planning for the erection of additions to cost about $100,000, including equipment.

The Gulf States

BIRMINGHAM, Oct. 11.

The Gray Engineering Works, Galveston, Tex., has acquired property on the ship canal at Clinton, near Houston, and has plans under way for the establishment of a shipyard, including a dry dock and a floating machine shop for repair work. The initial dry dock will have a capacity of 2500 tons, while a structure to be built later will have facilities for 10,000 tons, with machine shops, foundry and other buildings. The new plant is estimated to cost about $200,000. H. Gray is president.

The United Fiber & Products Co., New Iberia, La., recently organized with a capital of $1,000,000, is arranging for a stock issue of $300,000, to be used for the purchase of machinery for its proposed new paper mills. It has acquired the plant of the Sugar Cane By-Products Co., devoted to paper and pulp production, and additions will be erected. William T. Larkin is president.

The Guiberson Corporation, Dallas, Tex., manufacturer of oil well tools, is planning for an addition, 25 x 100 ft., to be equipped as a machine shop. R. S. Haseltine is manager.

Fire, Sept. 26, destroyed a portion of the works of the South Texas Implement & Vehicle Co., Wood and Willow streets, Houston, Tex., with loss reported at $15,000.

The Cook Automobile Co., Orlando, Fla., has awarded a contract to C. C. Hanner, Orlando, for a new service building and repair works, 80 x 90 ft., to cost about $60,000. J. M. Cook is head.

The Ford Motor Co., Detroit, is taking bids for a two-story assembling plant at Jacksonville, Fla., to cost about $250,000, including machinery.

Fire, Oct. 5, destroyed a section of the plant of the Wilson & Toomer Fertilizer Co., Jacksonville, Fla., with loss, including machinery, estimated in excess of $400,000.

The General Equipment & Welding Co., McComb, Miss., has completed plans for a new one-story machine shop, 40 x 135 ft., to cost about $40,000. W. R. Meeder is manager.

Fire, Oct. 1, destroyed the machine shops and locomotive buildings of the St. Louis, Brownsville & Mexico Railroad, Kingsville, Tex., with loss, including equipment, reported at $500,000.

The Diamond Carbon Co., Wardville, La., has plans under way for the erection of additions to cost about $250,000, including machinery.

The Willborn Brothers Tank Mfg. Co., Amarillo, Tex., will install considerable new machinery for the manufacture of the heavy welded tanks and gasoline and pressure tanks.

The Valley Gin Co., El Paso, Tex., has been incorporated with a capital stock of $40,000 by T. M. Berry, Lee Moor and M. E. Van Every.

Fred Miller, Hollis, Okla., will construct an electric light and power plant at Memphis, Tex., to replace that of the Texas Gas & Electric Co., recently destroyed by fire.

J. M. Messick, superintendent Orange Handle & Spoke Co., Orange, Tex., states that construction of the new plant will start soon. The output will be 26,000 handles and 5000 spokes per day.

A factory to rebuild and repair electric motors will be built by S. W. Oliver, Birmingham, Ala.

The Pacific Northwest

SEATTLE, Oct. 5.

The main subject of interest is price readjustments and both the wholesale and jobbing trades reflect the unsettled condition. Immediate needs seem to wholly govern purchasing. The demand for lumber continues light, with production greatly curtailed.

The Peacock Mill Co., Portland, contemplates the construction of a power plant in Umatilla County. It will be built in units and completed in four years, the first unit to cost $140,000.

The cities of Miles City, Terry and Glendive, Mont., plan to cooperate in the construction of a hydroelectric plant at Buffalo Rapids, to generate 15,000 hp. for the reclaiming of 75,000 acres in Eastern Montana. J. C. and Alvin C. Leighton, Miles City, are at the head of the project.

Victor Lindberg, Astoria, Ore., plans the establishment of a factory for the manufacture of cement blocks. It will have an initial daily capacity of 300 blocks.

Berg Brothers, Bremerton, Wash., owners of the Navy Yard City Mill Co., will erect a new sawmill on Port Orchard Bay, to replace the plant destroyed by fire. It will cost $85,000.

Leupold, Voelpel & Co., Portland, have been incorporated with $50,000 to manufacture and repair surveying and engineers' instruments. A factory will be established.

The Federal Telegraph Co. plans the construction at Hillsboro, Ore., of a $200,000 wireless station. F. H. Barstow is local manager.

California

SAN FRANCISCO, Oct. 5.

Machinery houses are experiencing a slight depression in business partly due to the uncertainty of prices. The recent power curtailment order issued by the State Railroad Commission is also a contributing factor and is causing a reduction of operations in many industries.

Steiger & Kerr, 2201 Folsom Street, San Francisco, plan to erect a $40,000 foundry at a point between San Francisco and San Jose.

William F. Kahler, Los Angeles, manufacturer of centrifugal sprinkling equipment, has acquired property on Columbia Street, South Pasadena, Cal., for a new plant estimated to cost about $40,000.

The Mullen Mfg. Co., 64 Rausch Street, San Francisco, manufacturer of woodenware specialties, has plans under way for a new two-story, reinforced-concrete plant, 125 x 125 ft., to cost about $50,000, replacing a structure recently destroyed by fire.

The Gay Auto Top Co., Santa Ana, Cal., has leased quarters in a new building to be erected at 509 East Fourth Street. Construction of the building will begin at once and is expected to be ready for occupancy at an early date.

The California Belting Co., Los Angeles, has filed notice of organization to operate at 165 North Los Angeles Street. R. E. Tolsma, 802 California Street, heads the company.

NEW TRADE PUBLICATIONS

Power Transmission Machinery.—A. & F. Brown Co., 79 Barclay Street, New York. Catalog, 129 pages, 5 x 8 in. Concerned with a line of power transmission machinery, including cut and machine molded gears, turned steel shafting, flexible insulated, compression and flange couplings, patent friction clutch couplings, friction clutch fixing devices, pulleys, countershafts, hangers, belt tighteners, rope sheaves, Cogswell ball mill color mixers, fly wheels, geared speed reducing devices, etc. The catalog is illustrated.

Balanced Draft.—Engineer Co., 17 Battery Place, New York. Bulletin D-20, 29 pages, 7¾ x 10¾ in., with the title "Modern Practice in Combustion Control." A description of the principles, apparatus and operation of balanced draft.

Welding and Cutting Apparatus.—Bastian Blessing Co., West Austin Avenue at La Salle Street, Chicago. Catalog 29, 56 pages, 7½ x 10½ in. Illustrates and describes Rego welding and cutting apparatus.

Pipe Coil Heaters.—Buffalo Forge Co., Buffalo, N. Y. Catalog No. 460, 68 pages, 8½ x 11 in. Describes the Buffalo standard heater, for use in connection with the fan system of heating and ventilating. The catalog is prepared for architects and engineers in figuring heat requirements for fan heating and ventilating work. Through the courtesy of the American Radiator Co., data relative to the Vento cast-iron heater are included. The catalog is illustrated.

Charging Equipment for Miners' Lamp Batteries.—Cutler-Hammer Mfg. Co., Milwaukee. Publication 834. Illustrates and describes a charging rack for miners' lamp batteries.

Oxy-Acetylene Machines for Cutting Plates.—Davis-Bournonville Co., Jersey City, N. J. Catalog. Describes the Radiograph, a portable machine for cutting plates to straight and curved lines. Instructions for setting and operating the Radiograph are given.

Short Turn Overhead Trolley.—S-T Engineering Corporation, Buffalo, N. Y. Catalog. Describes a short turn overhead trolley. Installation views are shown.

Insulating Compounds.—General Electric Co., Schenectady, N. Y. Bulletin No. 48704A. Devoted to insulating compounds, including insulating varnishes, japans, oils, stickers and shellacs, paints and sealing compounds.

Coal Crushers.—Jeffrey Mfg. Co., Columbus, Ohio. Folder. Illustrations showing a crusher reducing large lumps and run-of-mine coal to stoker size in a single operation.

Alligator Shears.—Canton Foundry & Machine Co., Canton, Ohio. Catalog, 23 pages, 8½ x 11 in. Illustrates and describes semi-steel shears built in various styles and sizes for cutting from 1 in. square to 3 in. square inclusive. The machines include high and low knife, belt and motor driven, stationary and portable machines.

Industrial Illumination.—Benjamin Electric Mfg. Co., 806 West Washington Boulevard, Chicago. Bulletin with the title "Putting Across a Big Thought in a Big Way." Presents text and illustrations for the purpose of driving home the advantages of correct industrial illumination.

Recording, Indicating and Controlling Instruments.—Bristol Co., Waterbury, Conn. Catalog. No. 303, 40 pages, 4¼ x 9¼ in. Presents the Bristol instruments for recording, indicating and controlling. These include pressure gages, vacuum gages, liquid level gages, recording thermometers, pyrometers, temperature controllers, ammeters, voltmeters, wattmeters, time recorders, tachometers, etc.

Clutch Equipment.—Hill Clutch Co., Cleveland. Bulletin 14. Largely illustrations showing clutch equipment for "running-in" tests of Winton automobile motors.

Semi-Automatic Lathe.—R. K. LeBlond Machine Tool Co., Cincinnati. Catalog with the title "Multi-Cuttings," 34 pages, 8 x 5½ in. Describes the company's No. 9 Multicut lathe. It will handle work centred chucked or held on arbors, to 9 in. diameter by 16 in. long.

Resistance Box and Apparatus for Hydrogen Ion Determination.—Pyroelectric Instrument Co., 636 East State Street, Trenton, N. J. Bulletin No. 14. Describes a new type of resistance box of flat coil construction, and an Elliott-Acree apparatus for hydrogen ion determination. The devices are illustrated.

Pyrometers.—Bristol Co., Waterbury, Conn. Bulletin No. 201. Devoted to Bristol pyrometers for indicating, recording and controlling temperatures up to 3000 deg. Fahr. in the heat-treatment of steel.

Acids.—Circular, Blackwell & Buck, 49 Wall Street, New York. Bulletin No. 11. Describes acids which constitute a large proportion of those commercially manufactured and exported. A few of the principal uses of each of the acids are mentioned.

Structural Material, Sheets and Plates, Plumbing Supplies, etc.—Brown-Wales Co., Fargo and Egmont streets, Boston, Mass. Catalog, 192 pages, 12 x 6¼ in. Lists iron and steel bars, sheets and plates, steam fitters' and plumbing supplies and hardware. Useful tables of weights and measures, revised list prices, extras, differentials, etc., are included.

Belt Conveyors and Bucket Loaders.—Barber-Greene Co., Aurora, Ill. Catalog No. 4, 32 pages, 8½ x 11 in. Illustrates and describes a line of belt conveyors and self-feeding bucket loaders. Interchangeability of parts is a feature. Views of the conveyors and loaders at works are included.

Overhead Carrying System.—Luden Machinery Co., Fairfield, Iowa. Catalog No. 5, 64 pages, 8 x 11 in. Descriptions with illustrations of an overhead carrying system for factories, garages, foundries, machine shops, etc. Numerous installation views are shown.

Electric Air Compressors, Drills and Valve Grinders.—Black & Decker Mfg. Co., Towson Heights, Baltimore, Md. Catalog, 30 pages, 8½ x 11 in. Devoted to a line of electric air compressors, portable electric drills and electric valve grinders. The catalog is illustrated.

Feed-Water Heaters, Expansion Joints, Steam and Oil Separators and Steam Heating Systems.—Warren Webster & Co., Camden, N. J. A series of bulletins inclosed in a cardboard cover. The bulletins are as follows: Bulletin 100, feed-water heaters, what they do and where they are doing it; bulletin 102, feed-water heaters, rectangular cast-iron types; No. 200, Webster-Lea heater meter; No. 301, steam separators of standard and receiver types; No. 401, oil separators; No. 701, Sylphon trap for draining radiators and coils; No. 851, Sylphon attachments for converting traps of other models into Sylphon traps; No. 1100, expansion joints; No. 702, series traps; No. 705, modulation valves; No. B500, vacuum system of steam heating. The catalogs are illustrated.

OFFICE CHANGES

Fred E. Russell, contracting engineer, specializing in tinning equipment and manufacture of "Quikbak" combination gage and drill holder, who has recently invented a unique insulated stove which heats an oven on all six sides, has moved his assembly quarters and general office to Langhorne, Pa., but maintains a city office in the Otis Building, Sixteenth and Sansom streets, Philadelphia.

The R. H. Beaumont Co., 319 Arch Street, Philadelphia, contractor for conveying and hoisting systems and complete power plants, has recently opened a Pittsburgh office at 230 Fifth Avenue. Thomas Widdop is in charge.

The Wagner Electric Mfg. Co., St. Louis, announces the removal of its Salt Lake City office to 59 West Broadway, and the opening of a service station at the same address. L. Brandenburger will continue as branch manager.

Cyril J. Bath & Co., Cleveland, machinery merchants, announce that on Oct. 1 they will move their display rooms and offices to their new location, 1603 St. Clair Avenue, where a stock of new and used tools will be carried. A used machinery warehouse and plant for rebuilding will remain at 1738 St. Clair Avenue.

The general offices of the Continental Machinery Co. have been removed from 1101 Security Building to 1521 Harris Trust Building, 111 West Monroe Street, Chicago.

The Phoenix Brass Co., 857 Springfield Avenue, Irvington N. J., has been incorporated with a capital of $100,000 by T. and Charles Donath, 89 Spruce Street, Bloomfield, N. J., and R. B. and Sidney M. Cowan, 755 South Twelfth Street, Newark, to manufacture brass and bronze products.

The Johnson Products Co., 140 Paris Street, Newark, N. J., has been organized to manufacture metal and composition snaps, and similar specialties. Charles J. Johnson, 282 Seymour Avenue, heads the company.

The United States Name Plate Co., Brooklyn, has been incorporated with a capital of $100,000 by L. Wang, J. W. Blohm and H. G. Taylor, 706 Riverside Drive, to manufacture metal name plates and similar specialties.

The Naugatuck Rubber Co., Inc., Naugatuck, Conn., has been incorporated with a capital of $50,000 by Adolph Tumat, George and Edward Hermonat, 8 Curtiss Street, to manufacture mechanical and other rubber products.

Offices of the West Penn Fuel Co., Pittsburgh, have been removed from the Commonwealth Building to the Keenan Building.

The John H. Sorg Co., of which John H. Sorg is head, has opened an office in the Heern Building, Penn Avenue and Eighth Street, Pittsburgh, as a manufacturers' representative. His line includes the valves, reamers and Lysholm tables manufactured by the Norbom Engineering Co., Philadelphia, and the wood cup leathers manufactured by J. H. Wood, Philadelphia.

Current Metal Prices

On Small Lots, from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Metal Markets."

Iron and Soft Steel Bars and Shapes

Bars:	Per Lb.
Refined iron, base price	5.50c.
Swedish bars, base price	20.00c.
Soft Steel:	
¾ to 1⅞ in., round and square	3.48c. to 4.75c.
1 to 6 in. x ⅜ to 1 in.	3.48c. to 4.75c.
1 to 6 in. x ¼ to 5/16	3.58c. to 4.75c.
Rods—⅝ and 11/16	3.53c. to 5.45c.
Bands—1½ to 6 by 3/16 to No. 8	4.18c. to 7.00c.
Hoops	5.68c. to 7.00c.
Shapes:	
Beams and channels—3 to 15 in.	3.58c. to 4.50c.
Angles:	
3 in. x ¼ in. and larger	3.58c. to 4.50c.
3 in. x 3/16 in. and ⅛ in.	3.83c. to 5.10c.
1½ to 2½ in. x ⅛ in.	3.63c. to 4.90c.
1½ to 2¾ in. x 3/16 in. and thicker	3.58c. to 4.85c.
1 to 1¼ in. x 3/16 in.	3.63c. to 4.90c.
1 to 1¼ x ⅛ in.	3.68c. to 4.95c.
⅞ x ⅞ x ⅛ in.	3.73c. to 5.00c.
¾ x ⅛ in.	3.78c. to 5.05c.
⅝ x ⅛ in.	4.18c. to 5.95c.
½ x 3/32 in.	5.28c. to 7.65c.
Tees:	
1 x ⅛ in.	3.98c. to 5.90c.
1¼ in. x 1¼ x 3/16 in.	3.88c. to 5.80c.
1½ to 2½ x 3/16 in. and thicker	3.68c. to 5.60c.
3 in. and larger	3.63c. to 5.30c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	5.40c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	5.90c.
Toe calk, ½ x ⅝ in. and larger	6.00c.
Cold-rolled strip (soft and quarter hard)	12c. to 14c.
Open-hearth spring steel	7.00c. to 10.00c.
Shafting and Screw Stock:	
Rounds	6.25c. to 7.00c.
Squares, flats and hex	6.75c. to 7.50c.
Standard cast steel, base price	15.00c.
Best cast steel	20.00c. to 24.00c.
Extra best cast steel	25.00c. to 30.00c.

Tank Plates—Steel

¼ in. and heavier ..... 3.78c. to 4.50c.

Sheets

Blue Annealed

	Per Lb.
No. 10	7.25c. to 8.30c.
No. 12	7.28c. to 8.35c.
No. 14	7.35c. to 8.40c.
No. 16	7.45c. to 8.50c.

Box Annealed—Black

	Soft Steel C.R., One Pass Per Lb.	Wood's Refined, Per Lb.
Nos. 18 to 20	8.40c. to 9.90c.	———
Nos. 22 and 24	8.45c. to 9.85c.	10.80c.
No. 26	8.50c. to 9.90c.	10.85c.
No. 28	8.60c. to 10.00c.	11.00c.
No. 30	8.70c. to 10.10c.	———

No. 28, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14	8.85c. to 11.00c.
No. 16	9.10c. to 11.25c.
Nos. 18 and 20	9.25c. to 11.40c.
Nos. 22 and 24	9.40c. to 11.55c.
No. 26	9.55c. to 11.70c.
No. 27	9.70c. to 11.85c.
No. 28	9.85c. to 12.00c.
No. 30	10.35c. to 12.50c.

No. 28, 36 in. wide, 20c. higher.

Pipe

Standard—Steel	Blk.	Galv.	*Wrought Iron*	Blk.	Galv.
½ in. Butt...	—34	—17	¾-1½ in. Butt.	— 3	+17
¾-3 in. Butt.	—38	—22	2 in. Lap.....	+ 3	+21
3½-6 in. Lap.	—33	—18	2½-6 in. Lap...	+ 1	+17
7-12 in. Lap..	—23	— 6	7-12 in. Lap...	+12	+30

Steel Wire

BASE PRICE* ON NO. 9 GAGE AND COARSER	Per Lb.
Bright basic	10.00c.
Annealed soft	10.00c.
Galvanized annealed	10.75c.
Coppered basic	10.50c.
Tinned soft Bessemer	12.00c.

*Regular extras for lighter gages.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	28¼c. to 29½c.
High brass wire	28¼c. to 29½c.
Brass rod	26¾c. to 29 c.
Brass tube	43½c. to 45½c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 29½c. per lb. base.

Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20
IC	$16.50	$14.25
IX	18.75	16.25
IXX	20.50	18.00
IXXX	22.25	19.75
IXXXX	23.75	21.50

Coke—14x20	Primes	Wasters
80 lb.	11.80	11.55
90 lb.	11.90	11.65
100 lb.	12.00	11.75
IC	12.25	12.00
IX	13.25	13.00
IXX	14.25	14.00
IXXX	15.25	15.00
IXXXX	16.25	16.00

Terne Plates

8-lb. Coating 14 x 20

100 lb	$ 9.35
IC	9.50
IX	10.50
Fire door stock	12.75

Tin

Straits pig	46c.
Bar	55c. to 59c.

Copper

Lake ingot	19¾c.
Electrolytic	19¼c.
Casting	19c.

Spelter and Sheet Zinc

Western spelter	9½c. to 10c.
Sheet zinc, No. 9 base, casks	14½c. open 15c.

Lead and Solder*

American pig lead	8¾c. to 9¾c.
Bar lead	11c. to 12c.
Solder, ½ and ½ guaranteed	32c.
No. 1 solder	29½c.
Refined solder	25½c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	90c.
Commercial grade, per lb.	50c.

Antimony

Asiatic	9c. to 10c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb. .... 35c. to 38c.

Old Metals

The market continues depressed with prices a little lower. Dealers' buying prices are as follows:

	Cents per lb.
Copper, heavy and crucible	14.75
Copper, heavy and wire	14.00
Copper, light and bottoms	12.50
Brass, heavy	8.50
Brass, light	6.50
Heavy machine composition	13.75
No. 1 yellow brass turnings	8.75
No. 1 red brass or composition turnings	11.75
Lead, heavy	6.50
Lead, tea	4.00
Zinc	5.50